# Chapter 3. Core countries

## 3.1 Overview

*Chapter 1 has focused on large climate anomalies that sometimes reach the size of continents and beyond. The present section offers a closer look at individual countries, including the 41 countries that together produce and commercialize 80 percent of maize, rice, wheat, and soybean. As evidenced by the data in this section, even countries of minor agricultural or geopolitical relevance are exposed to extreme conditions and deserve mentioning, particularly when they logically fit into larger patterns.*

**1. Introduction**

Table 3.1 presents the agroclimatic and agronomic indicators for the period from October 2018-January 2019, showing their departure from the five and fifteen-year averages as applicable. Figures 3.1 through 3.4 show the underlying CWAI indicators. While chapter 1 focuses on global climate patterns that characterize the current ONDJ reporting period using large spatial units, the present introduction to chapter 3 focuses on countries, i.e. it aims at identifying countries that suffered abnormal climatic conditions and resulting abnormal agronomic conditions. 164 countries and territories are included, omitting only those which are too small to yield meaningful results at the spatial resolution (approximately 25 km x 25 km at the equator) adopted for the CropWatch agroclimatic indices (CWAIs). They include mostly small island states.

Only for the 41 major producers and China (41+1 countries), Table 3.1 also lists departures from important agronomic variables including the biomass production potential (BIOMSS), Cropped Arable Land Fraction (CALF) and the maximum Vegetation Condition Index (VCIx). BIOMSS provides the rainfall and temperature limited contribution of the reporting period to annual biomass accumulation. CALF indicates which fraction of arable land was actually cropped. Positive departures mean that cultivated area increased over the average of the previous five years (5YA). VCIx is a measure of yield compared with historical yield for the same locations. High values identify areas where crops performed as well as during the best recent years. Below 0 and above 1 values stand for “worst ever” and “best ever”, respectively.

The major climatic characteristics and anomalies of the reporting period are listed in Chapter 1 and are not repeated in this section which, as mentioned, focuses on countries. Figures 3.1 to 3.4 (RAIN, TEMP, RADPAR and BIOMSS departures, respectively) bear a marked resemblance to the corresponding figures in Chapter 1, although the spatial detail is greater in this chapter where figures include not only countries but also first-level administrative units for the 8 largest countries of the world, of which Kazakhstan is the smallest.

Readers are also invited to consult section 5.2 (Chapter 5) on disasters where additional information is provided for major disasters that occurred during the reporting period, and table 3.1 – mentioned above – which summarizes the indicators for the 41 major agricultural countries.

The section below starts with a list of abnormal conditions among the major exporters

**2. Overview of weather conditions in major agricultural exporting countries**

The available agronomic indicators do not carry the same statistical weight as the agroclimatic indicators because only selected countries are covered. It is, nevertheless, interesting to

compare the countries and to highlight “good” and “bad” performers among the top 10 exporters of maize, rice, wheat and soybean.

In the southern hemisphere, Argentina, Paraguay, Uruguay and southern Brazil are currently in their summer season. All experienced negative temperatures departures increasing from south to north: -1.3°C in Argentina, -0.8°C and -0.9°C in Paraguay and Uruguay, respectively, and -0.5°C in Brazil. In Brazil, the average results from areas cooler than average by 1.0°C to 1.3°C (Tocantins, Mato Grosso, Acre, Maranhao and Para states) and warm areas such as Santa Clara (+0.4°C) and Rio Grande Do Norte (+1.0°C).

Rainfall was close to average in Brazil and Paraguay but excessive (+29%) in Argentina and very excessive (+63%) in Uruguay where rice but especially soybean and maize are likely to have suffered water logging, replaying the scenario of other recent years. Major production areas have been affected in Argentina, including Entre Rios (also referred to as Mesopotamia +78%), Santa Fe, Corrientes and La Rioja (all close to +50%) and, at +25%, La Pampa and Buenos Aires. In Uruguay all Departments had excess precipitation with the lowest values in Treintay Tres (+28%) and Cerro Largo (+30%) and the highest ones, all exceeding +80% in Canelones, Colonia and Paysandú. The precipitation may, however, provide beneficial soil moisture storage for the next winter wheat crop season.

In India, the major rice exporter, the rice season is over in the main northern producing States of West Bengal, Uttar Pradesh, Punjab, Odisha and Andhra Pradesh which output about half the national rice production. The reporting period includes the harvest of late kharif crops, mainly in the south. Nationwide, RAIN was generally in short supply (-35%) during the JASO period but too late to negatively affect crops. In Pakistan, where the crop calendar is similar to India’s, 35% rainfall excess is basically irrelevant for rice exports.

In Thailand, Cambodia and Vietnam, the reporting period covers the harvest of the monsoon season rice as well as the early stages of dry-season rice. Rainfall was generally low in Cambodia (-20%) but closer to normal in Thailand (+10%) and Vietnam (-8%). Especially in Cambodia

Temperature and RADPAR were close to average among the major rice exporters.

Among the main wheat exporters, most are northern hemisphere countries growing winter wheat. The crop is currently in the field after planting from September to December 2018. The most “abnormal” precipitation records include Russia (-10%, a weak deficit) and the United States (+40%). Other countries had close to average precipitation. With the exception of France (1.6°C below average temperature, with CALF about average) all had close to average temperature but variable sunshine (-7% in the United States, +5% in Russia and +7% in Ukraine, where CALF increased by a spectacular 13%). The United States and Canada had among the largest CALF drops among the main agricultural countries (-6% and -15%, respectively). Altogether, wheat prospects are not negatively affected by unfavorable conditions during the current reporting period.

In Romania, one of the major European wheat exporters next to France and Germany, CALF was well below the recent average (-25%), with a modest VCIx value of 0.64.

Australia is one of the main southern hemisphere exporters of wheat; the crop was at harvesting during the first months of the reporting period. Altogether, environmental conditions were unfavorable with drought and floods reported from the country (overall, rainfall was down 7%). Positive values do occur in the south (Tasmania +9%, Victoria +12% and South Australia +24%) while in Queensland (-12%) and western Australia (-25%) the ONFJ balance remained negative.

The national VCIx is just average but CALF is down 20% compared with the previous five years. Altogether, favorable wheat output is unlikely.

**3. Agronomic indicators**

Romania suffered the largest decrease in CALF among the monitored countries (-35%) without any obvious excessive environmental conditions or disaster reports to explain the reduction. The situation is paralleled by Hungary (-17%) where, however, VCIx reaches 0.78 (as opposed to 0.64, a low value) in Romania.

Next to the already mentioned low CALF values in North America and Australia, unfavorable CALF behavior also occurred in Uzbekistan (-30%).

Large increases between 10% and 20% occurred in Zambia (12%), Mozambique, Ukraine, Kazakhstan, Turkey and Pakistan (19%); between 25% and 30% in Afghanistan, Morocco and Mongolia. Some of the countries (Morocco, Zambia) are in their main growing season and suffered from a precipitation deficit close to 15%. Both have nevertheless very favorable VCIx (0.93 and 1.08, respectively) which should result in fair crops.

The lowest VCIx values between 0.45 and 0.72 were observed in Afghanistan (0.45), Australia, South Africa, Romania, Canada and Pakistan (0.72). While the presence of Romania in the list confirms the somewhat puzzling low CALF, it is in order to highlight the situation in South Africa. While CALF dropped only 3% nationwide, VCIx (0.62) indicates a mediocre maize crop which results from moderately low precipitation (-15%) at country level. Several summer crop areas, however, had more marked precipitation deficits during the current maize season, including the Free State where rainfall was down 26%. Less severe shortfalls affected Kwa Zulu-Natal (-4%) and Limpopo (-9%). The Free State also had a marked increase in sunshine (+10%). Among other major maize growing areas, Mpumalanga seems to be doing fine but the conditions in the North-West closely resemble those of the Free State, with rainfall down 28% and sunshine up 8%, increasing crop water demand.

High VCIx occurs mostly in Asia, starting with Sri Lanka (0.98), Indonesia and Vietnam (0.96), and the Philippines (0.95). All those countries had average CALF and positive RADPAR departures. Rainfall was average or below (Philippines, -25%). All the countries had a crop in the field (mostly rice, but also maize) for which prospects re thus favorable. High values are also observed in Morocco (1.08), Egypt (1.00), Mozambique (0.96) and Iran (0.95) which also recorded CALF increases between 10% (Egypt) and 50% (Iran).

In the American continent, the largest VCIx values occur in Brazil (0.95) and Mexico (0.93); in Europe in Belarus (0.94) and Poland (0.91), two countries with unusually favorable sunshine (+13% and +8%, respectively).

**4. Abnormal rainfall**

An unusually large number of countries experienced precipitation deficits (larger than 30%), mostly in the Caribbean, Central America and northern South America. They include Guyana (-56%), Jamaica (-52%), Suriname (-52%), French Guyana (-43%), the Dominican Republic (-40%) and Cuba (-38%). Several had deficits in excess of 20%, including Panama, Belize, Venezuela, Costa Rica and Trinidad and Tobago. Amounts recorded were usually around 200 mm when expected amounts are close to 400 mm and more. Most of the listed countries are now in their dry season, so that the deficit mostly corresponds to the end of the previous cropping season. For the southernmost countries, which enjoy mostly equatorial conditions, the deficit may even

prove beneficial if it does not extend into the next months as it was generally accompanied by abundant sunshine in countries where cloudiness is a limiting factor.

Low rainfall in Asia affected essentially an isolated country in eastern Asia (Japan, -53%) but mostly the south (Bhutan -49%, Nepal -48%, Bangladesh -328%, India -35%) and – to a lesser extent - the south-east (Laos -22%, Cambodia -20% and the Philippines-25%). New Caledonia, which is part of Oceania, is also mentioned here with -36%. The area also covers north-eastern China including and north of the provinces of Liaoning (-37%) and Hebei (-45%.) They are winter crop areas and the major risk is insufficient snow resulting in frost kill.

In eastern and southern Africa, several countries that suffered from the latest El Niño in 2015-16 are affected by drought again, including – in the south – Namibia (-44%), Botswana (-33%), Zimbabwe (-32%), Lesotho (-28%) and Angola (-21%) and – in the east – Somalia (-40%) and, both about -20%, Kenya and Rwanda. In view of the ongoing main cropping season in the first group, February rainfall will be very critical for the final outcome of the agricultural season.

Finally, four European countries recorded a deficit between 20 and 30%, but raise little concern in view of the limited importance of winter crops at high latitudes: Denmark, Sweden, Finland and the Netherlands. The same applies to a long list of Oblasts in Russia, which are adjacent to Scandinavia, centered around the Republic of Mordovia and the Oblasts of Moscow and Vladimir (all three units at -32%) and extending as far east as western Kazakhstan.

Rainfall excesses are reported from the southern Mediterranean and the Arabian Peninsula where, however, average precipitation tends to be very low during the reporting period (50 mm or less), so that large excess percentages represent relatively modest volumes of water. They do, however, replenish aquifers, boost the growth of rangeland vegetation and generally favorably affect agriculture. This applies to Oman, Yemen, Kuwait and Saudi Arabia. In the Mediterranean and adjacent areas, abundant rainfall affected Turkey, Libya, Lebanon, Iran, Greece and Syria (+26% to +48%) and more significantly Tunisia (+54%), Cyprus (+57%) and Iraq +61%. All those countries are in their main growing seasons and precipitation is welcome. Next to Iran, but further east, Pakistan is one of the countries that recorded the largest positive precipitation anomalies in Asia (+35%). Turkmenistan had a 36% excess of rainfall.

The list includes more countries across all continents, starting with New Zealand (which is also one of the MRUs discussed in Chapter 1, + 36%), Uruguay (+63%), the United States (+40%), the Republic of Korea and Moldova (both at +80%).

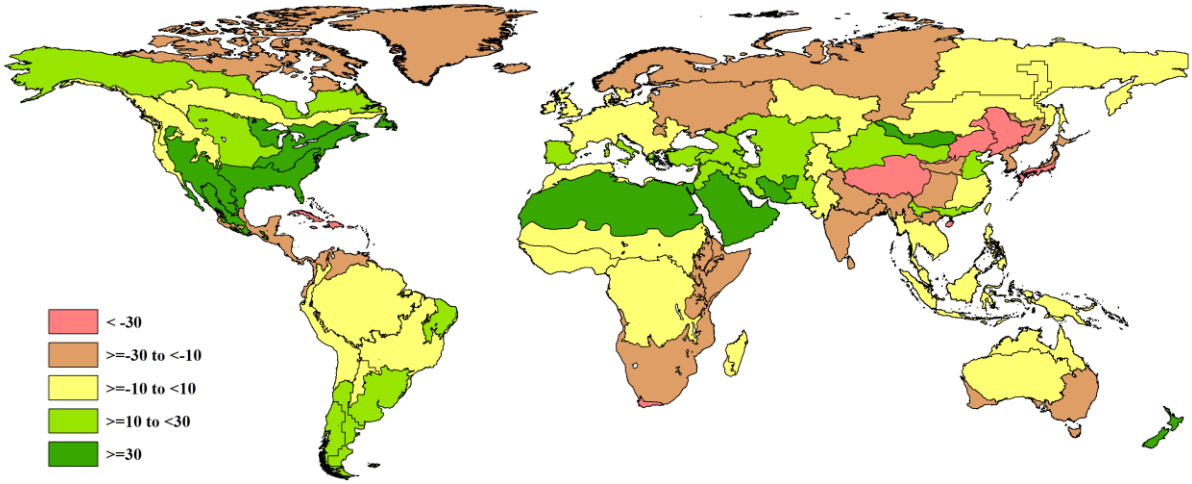


**Figure 3.1. Global map of October 2018 to January 2019 rainfall (RAIN) by country and sub −national areas, departure from 15YA (percentage).**

### 5. Abnormal Temperature

The most abnormally low temperatures occurred in Eswatini (-1.7°C) and neighboring Malawi (-1.5°C) and Mozambique (-1.4°C) where average values for the season are close to 25°C. This is unlikely to have created problems, on the contrary: lower than expected temperature has reduced crop water requirements at a time when the main cereal in the region was about to reach flowering.

Europe also experienced some low temperature values with departures ranging from 1.1°C below average in Sweden to 1.6°C below average in France. Tunisia and Portugal, both at -1.2°C compared with average, belong to the same area.

Finally, the two southernmost countries in Latin America, Chile and Argentina, now in their summer season, both had a modest drop in temperature compared with the average of -1.2°C and -1.3°C, respectively.

Relatively warm winter conditions prevailed in the Caucasus (Azerbaijan and Georgia, departure of +1.1°C; Armenia, +1.4°C) and surrounding areas, in southern Africa (Angola and Namibia, +1.4°C and +1.6°C, respectively) and Mongolia (+1.6°C). In Central America both Belize and Guatemala had temperature 1.6°C above average.

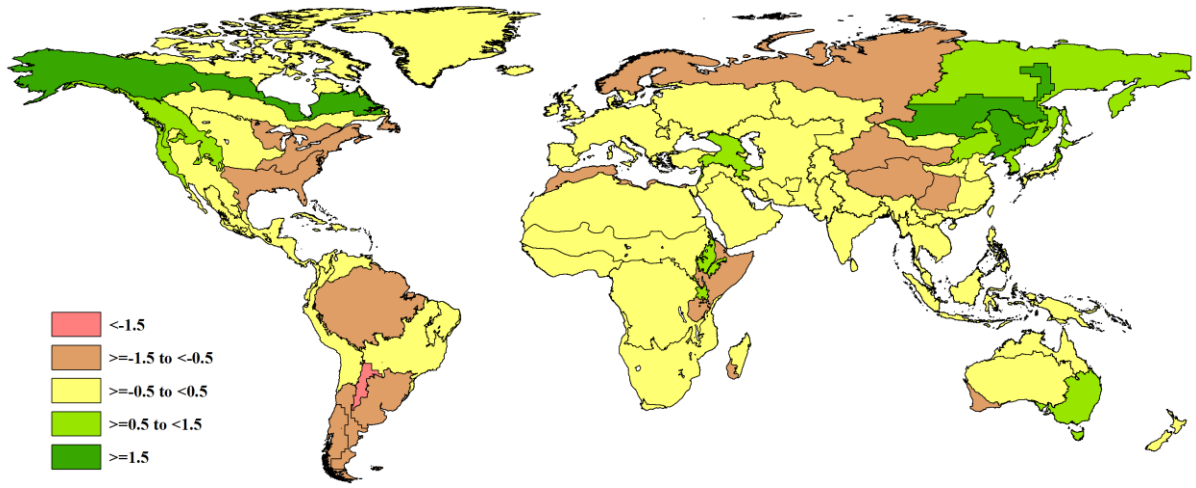



**Figure 3.2. Global map of October 2018 to January 2019 temperature (TEMP) by country and sub −national areas, departure from 15YA (degrees C).**

### 6. Sunshine

At the national level, RADPAR was particularly low in the already mentioned cool area centred on the Caucasus and the Middle-East and spanning 4500 km from Bulgaria to the Almaty region in Kazakhstan and Himachal Pradesh in India. This encompasses Iraq (-11%), Syria (-10%), Armenia (-9%), Turkey, and Tajikistan (both a -8%), Uzbekistan (-5%), Iran and Kuwait (-7% both) and Lebanon and Azerbaijan (-6% both).

China, which includes as well areas with large positive RADPAR departures, suffered a 6% deficit nationwide. The largest provincial values include those of Guizhou, Guangxi and Hunan which are close to -20%, which is considerable. Seven provinces have values between -17% and -10%: Jiangxi, Fujian, Zhejiang, Chongqing, Guangdong, Shanghai and Hubei, in increasing order.

In the United States, the globally negative RADPAR values (-6%) results from widespread negative departures in the eastern half of the country. However, deficits were moderate

compared with China (lowest values around -10% in Oklahoma, Texas, Kansas, Louisiana and Arkansas).

Low values also affected northern Argentina (-8%), Uruguay (-6%) and across Bolivia (-2%) to Peru (-3%).

Large departures of +10% appear in areas that were already mentioned above, i.e. central America (Belize +10%, Honduras +11%, Costa Rica +14%) and especially Baltic and Scandinavian countries, and the Netherlands: Lithuania +16%, Latvia +17% and Belarus +13%; Sweden +11% and the Netherlands +12%.

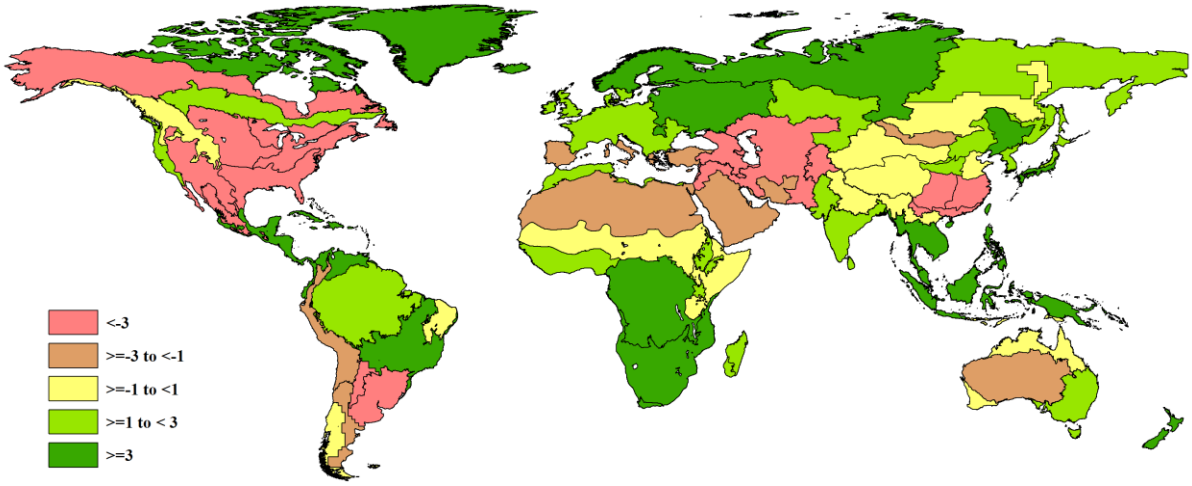



**Figure 3.3. Global map of October 2018 to January 2019 photosynthetically active radiation (RADPAR) by country and sub −national areas, departure from 15YA (percentage).**

## 7. Biomass production potential

The response of BIOMSS to RAIN is very spectacular in semi-arid countries such as Yemen (+84%), Eritrea (+85%) and Saudi Arabia with +168%. Total biomass amounts, however, do not exceed 160 grammes DM $m^{-2}$ (Eritrea). The lowest values are brought about by Caribbean and central American drought (-38% in Guyana).

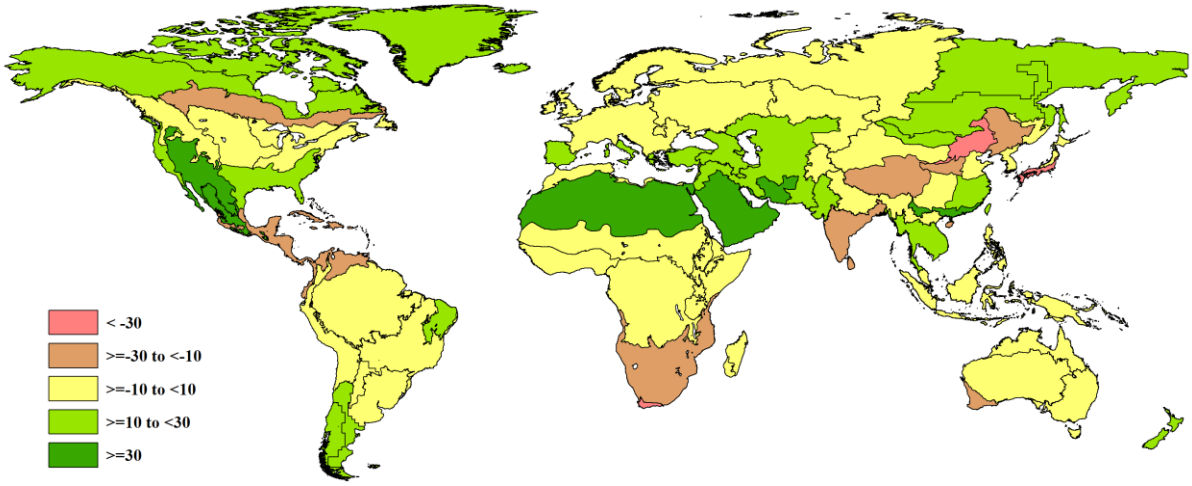



**Figure 3.4. Global map of October 2018 to January 2019 biomass production potential (BIOMSS) by country and sub −national areas, departure from 15YA (percentage).**

## 8. Combinations of extremes

Namibia recorded very unusual data for rainfall (-44%), temperature (+1.6°C), sunshine (+12%) and BIOMSS at -34%, making it probably the most anomalous country, climatically, for the period from October 2018 to January 2019.

In Armenia the corresponding values were +21%, +1.4°C, -9% and +7%. The country is part of a larger Middle-eastern cluster where all countries follow the same pattern (RAIN up, TEMP up, RADPAR down and BIOMSS up). They include Iraq (+61%, +0.8°C, -11% and +64%), Kuwait (121%, +0.6°C, -7%, 63%) and Syria (+48%, +1.0°C, -10% and 43%).

The three remaining countries represent South America with Argentina (+29%, -1.3°C, -8%, 8%) and Guyana (-56%, -0.5°C, 4%, -38%), and the Baltic states in Europe: Latvia (-19%, 0.1°C, 17%, 1%).

**Table 3.0. October 2018 - January 2019 agro-climatic and Agronomic indicators by country, current value and departure from average.**

| Code | Country | Agro-climatic indicators | | | Agronomic indicators | | |
|---|---|---|---|---|---|---|---|
| | | Departure from 15YA (2003-2017) | | | Departure from 5YA (2013-2017) | | Current |
| | | RAIN (%) | TEMP(°C) | PAR (%) | BIOMSS (%) | CALF (%) | VCIx |
| **AFG** | Afghanistan | -6 | -0.7 | -3 | 1 | 25 | 0.45 |
| **AGO** | Angola | -21 | 1.4 | 9 | -16 | -1 | 0.82 |
| **ARG** | Argentina | 29 | -1.3 | -8 | 8 | 8 | 0.84 |
| **AUS** | Australia | -7 | 0.6 | 1 | -7 | -19 | 0.60 |
| **BGD** | Bangladesh | -38 | -0.2 | 1 | -18 | 3 | 0.92 |
| **BLR** | Belarus | -8 | -0.3 | 13 | -3 | 2 | 0.94 |
| **BRA** | Brazil | -1 | -0.5 | 4 | 1 | 2 | 0.95 |
| **KHM** | Cambodia | -20 | 0.2 | 6 | -2 | 2 | 0.88 |
| **CAN** | Canada | 6 | -0.2 | -1 | -11 | -15 | 0.71 |
| **CHN** | China | -7 | 0.0 | -6 | -1 | -2 | 0.88 |
| **EGY** | Egypt | -3 | -0.5 | 0 | 23 | 10 | 1.00 |
| **ETH** | Ethiopia | -5 | 0.9 | 2 | 3 | 0 | 0.83 |
| **FRA** | France | 1 | -1.6 | 3 | 5 | -1 | 0.82 |
| **DEU** | Germany | -6 | 0.7 | 6 | 4 | -1 | 0.91 |
| **HUN** | Hungary | 22 | 0.7 | 4 | 16 | -17 | 0.78 |
| **IND** | India | -35 | 0.1 | 2 | -24 | 0 | 0.82 |
| **IDN** | Indonesia | -1 | -0.4 | 4 | -1 | 1 | 0.96 |
| **IRN** | Iran | 38 | 1.0 | -7 | 26 | 51 | 0.95 |
| **ITA** | Italy | 22 | 0.2 | 1 | 12 | 5 | 0.89 |
| **KAZ** | Kazakhstan | 2 | -0.4 | 1 | -3 | 18 | 0.74 |
| **KEN** | Kenya | -21 | -0.5 | 1 | -13 | 2 | 0.87 |
| **MEX** | Mexico | 23 | -0.5 | -3 | 36 | 6 | 0.93 |
| **MNG** | Mongolia | -15 | 1.6 | 1 | 11 | 30 | 0.84 |
| **MAR** | Morocco | -17 | -0.5 | 2 | -12 | 29 | 1.08 |
| **MOZ** | Mozambique | 12 | -1.4 | 0 | 8 | 13 | 0.96 |
| **MMR** | Myanmar | 22 | -0.1 | -1 | 24 | 1 | 0.92 |
| **NGA** | Nigeria | 16 | -0.3 | 1 | 13 | 2 | 0.91 |
| **PAK** | Pakistan | 35 | -0.5 | -2 | 27 | 19 | 0.72 |
| **PHL** | Philippines | -25 | -0.2 | 7 | -18 | 0 | 0.95 |
| **POL** | Poland | -1 | 0.6 | 8 | 6 | 0 | 0.92 |
| **ROU** | Romania | 35 | 0.2 | 1 | 18 | -35 | 0.64 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **RUS** | Russia | -10 | 0.0 | 5 | 0 | 8 | 0.79 |
| **ZAF** | South Africa | -15 | 0.1 | 8 | -19 | -3 | 0.62 |
| **LKA** | Sri_Lanka | 2 | -0.6 | 3 | 2 | 1 | 0.98 |
| **THA** | Thailand | 10 | 0.5 | 4 | 20 | 0 | 0.84 |
| **TUR** | Turkey | 26 | 0.9 | -8 | 17 | 18 | 0.86 |
| **UKR** | Ukraine | 19 | -0.5 | 7 | 8 | 13 | 0.85 |
| **GBR** | United Kingdom | -13 | -1.4 | 3 | 1 | 0 | 0.91 |
| **USA** | United States | 40 | -0.5 | -7 | 10 | -6 | 0.84 |
| **UZB** | Uzbekistan | -12 | 0.5 | -5 | 1 | -30 | 0.82 |
| **VNM** | Vietnam | -8 | 0.5 | 4 | 23 | 2 | 0.96 |
| **ZMB** | Zambia | -14 | -0.7 | 2 | -14 | 12 | 0.94 |

## 3.2 Country analysis

3.2 Country analysis

This section presents CropWatch analyses for each of 41 key countries (China is addressed in Chapter 4). The maps refer to crop growing areas only and include several graphs: (a) Phenology of major crops; (b) Crop condition development based on NDVI over crop areas at national scale, comparing the October 2018 - January 2019 period to the previous season and the five-year average (5YA) and maximum; (c) Maximum VCI (over arable land) for October 2017 - January 2018 by pixel; (d) Spatial NDVI patterns up to October 2018 - January 2019 according to local cropping patterns and compared to the 5YA; and (e) NDVI profiles associated with the spatial pattern under (d). Next, separate graphs (labeled as figures (f), (g), and subsequent letters) are included to illustrate crop condition development graphs based on NDVI average over crop areas for different regions within the country, again comparing the October 2017 - January 2018 period to the previous season and the five-year average (5YA) and maximum.

Refer to Annexes A and B for additional information about indicator values and production estimates by country. Country agricultural profiles are posted on **www.cropwatch.com.cn/htm/en/bullAction!showBulletin.action**.

Figures 3.5 - 3.45.; Crop condition for individual countries ([AFG] Afghanistan - [ZMB] Zambia) including sub-national regions during October 2018 - January 2019.

# [AFG] Afghanistan

The reporting period corresponds to the harvest of rice in the irrigated desert areas of the south and the planting of winter wheat.

The country recorded below average rainfall (150mm, -6%), below average TEMP (5°C, -0.7°C) and below average RADPAR (765MJ/m², -3%), which resulted in just above average BIOMSS (460gDM/m², +1%). According to the NDVI profiles for the country, values were very low and below average. The cropped arable land fraction (CALF) was only 3%, which represents a significant rise (25%) above the 5YA. There is only a very limited area that has high VCIx, mainly located in northern central part in the provinces of Kunduz and Takhar. This corresponds to the only area (10.7%) of the arable land where NDVI departure reached positive values just under 0.1, which is significant. About half (46.2%) of cropland in Afghanistan had close to average crops throughout the reporting period.

Winter crop condition is assessed as low to average.

**Regional analysis**

CropWatch subdivides Afghanistan into four zones based on cropping systems, climatic zones and topography. They are described below as Dry, Central, Dry with irrigated cultivation, and Dry and grazing regions.

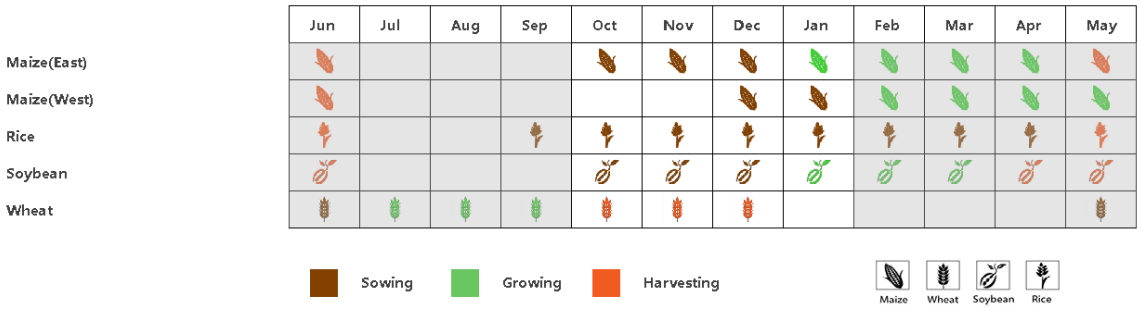
Vegetation is sparse in the Central region. The zone experienced an increase in RAIN of 6% above average with a significant reduction in TEMP (-0.6 °C) and an reduction in RADPAR (-2%). BIOMSS reached 471gDM/m² and was 7% above average. The average VCIx (0.38) and CALF (2%) were low.

The Dry and grazing region with mixed dry farming recorded 125 mm of precipitation, 26% below average, and 4.9°C (-0.9°C). RADPAR was close to the average, at 785MJ/m². The average VCIx for this region was only 0.28.

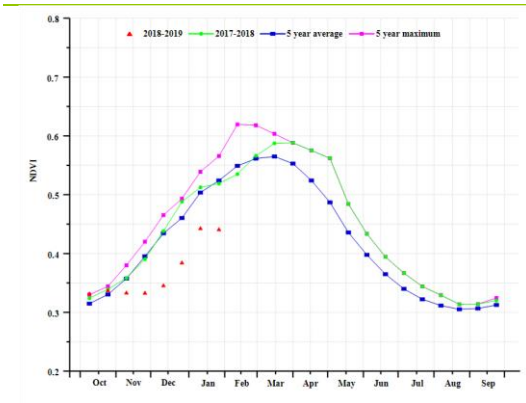
In the arid Dry region RAIN was just 135mm and 19% above average with below average TEMP at 7.9°C (-0.7°C). RADPAR was close to the average, at 874MJ/m². BIOMSS reached 379gDM/m² and was 11% above average. CALF was very low (only 1%).

In the Dry and irrigated cultivation region (mixed dry farming and irrigation), precipitation was 9% below average and temperature was below average (TEMP -0.5°C). The region had higher VCIx (0.74) and CALF increased by 28%. However, Crop condition development graph showed that NDVI value during the monitoring period was below 0.2.

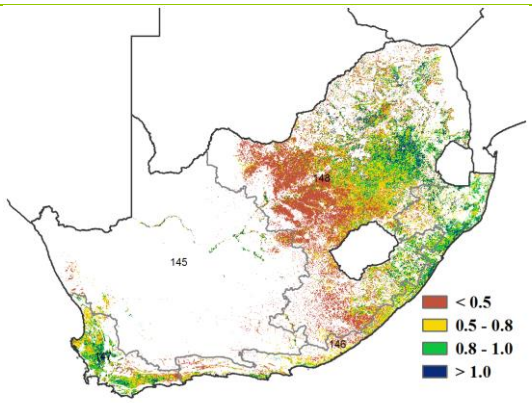
**Figure 3.5. Afghanistan's crop condition, July -October 2018**



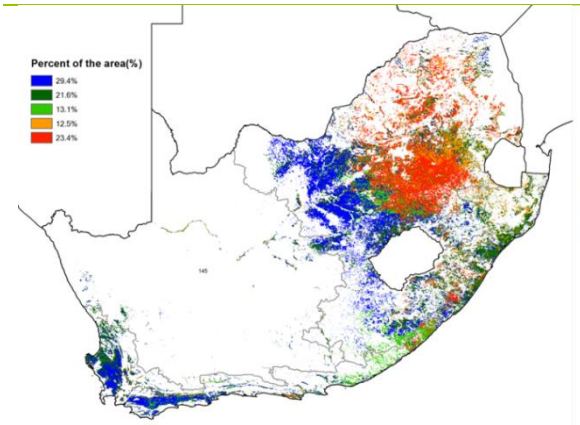

(a). Phenology of major crops



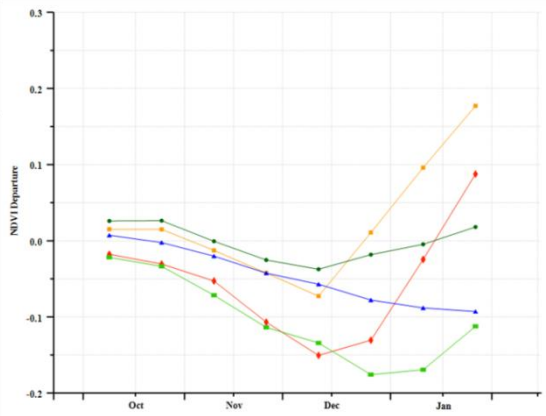

(b) Crop condition development graph based on NDVI



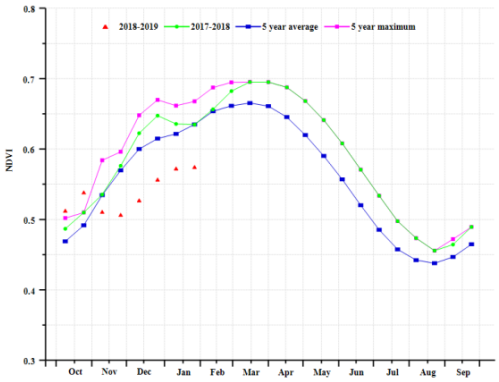

(c) Maximum VCI

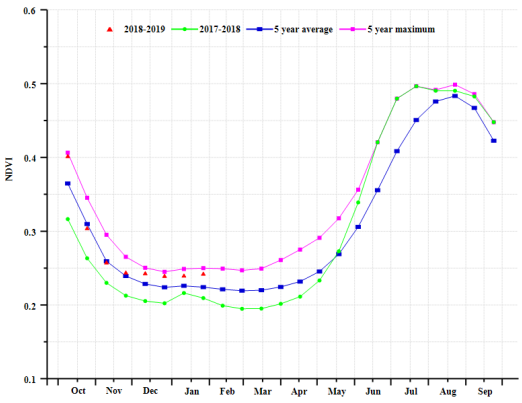



(d) Spatial NDVI patterns compared to 5YA

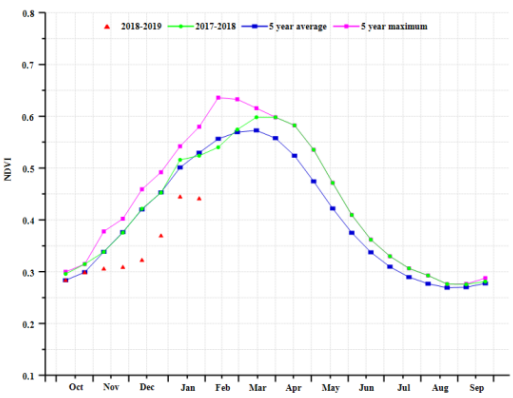


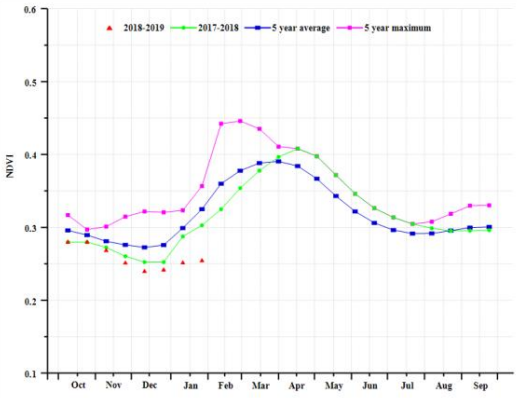

(e) NDVI profiles




(f) Crop condition development graph based on NDVI ( central_Sparse_Veg Region (left) and Mixed_Farming_Graze Region (right))



(g) Crop condition development graph based on NDVI (Mixed_Dry_Irrigated Region (left) and Dry (right))

**Table 3.1. Afghanistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Central region | 363 | -7 | 20.5 | -0.4 | 1356 | 7 |
| Dry region | 37 | -56 | 18.9 | 0.2 | 1632 | 3 |
| Dry and irrigated cultivation region | 352 | -15 | 21.3 | 0.1 | 1605 | 9 |
| Dry and grazing region | 71 | -58 | 22.0 | 0.9 | 1744 | 7 |

**Table 3.2. Afghanistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Central region | 1037 | -12 | 0.9 | 0 | 0.7 |
| Dry region | 164 | -51 | 0.6 | 3 | 0.4 |
| Dry and irrigated cultivation region | 1101 | -17 | 0.6 | -4 | 0.6 |
| Dry and grazing region | 269 | -56 | 0.2 | 1 | 0.6 |

# [AGO] Angola

Maize and rice were in the sowing and growing season while wheat was harvested in October.

Compared with average rainfall was lower (RAIN -21%) and both temperature and sunshine were up (TEMP 1.4°C, RADPAR 0.3%), marginally so for RADPAR. Mostly due to the drop in precipitation, BIOMASS fell 15% below average. At end of October and the beginning of November, the NDVI development graph shows that crop condition was below the 5 years average and below the corresponding values during the previous years. CALF was about average (1% below the 5YA) and the maximum VCI reached 0.82.

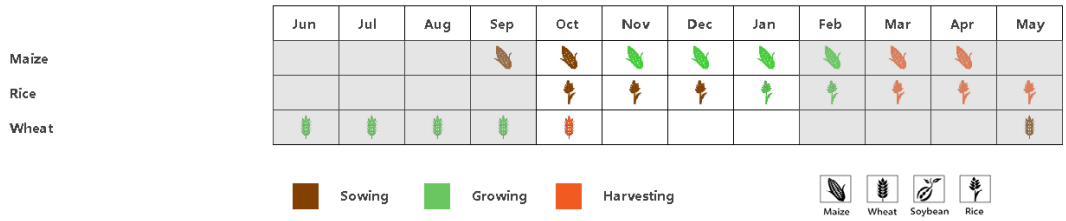
NDVI patterns indicate that a large section of the country (35% of cropped areas), mostly in the Southern regions, experienced below average crop condition. The least favorable condition was recorded at the end of December when about 50% of crop areas were below the 5 years average. Favorable crop condition (maximum VCI between 0.8 and 1.0) was observed in the provinces of Zaire, Uige, Cuanza Norte and Cuanza Sul. In general, however, the country suffered below average crop condition.

## Regional Analysis

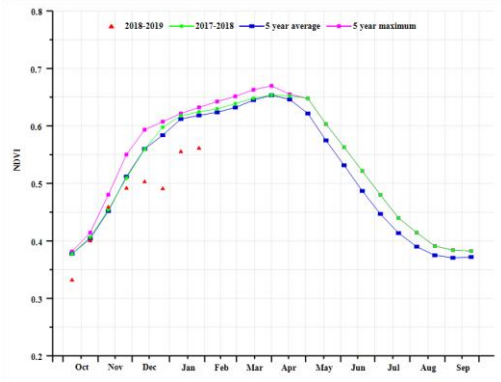
Considering the cropping systems, climatic zones and, and topographic conditions, Angola is divided into five agro −ecological zones (AEZs): Sub-humid, Humid, Arid, Semi-arid and Desert.

All ago-ecological regions suffered a shortage of rain, but temperature and RADPAR were above average. The most significant decrease in rain was observed in the Arid and Semi-arid zones (RAIN -40% and- 37%, respectively). The Desert zone showed a very large increase in temperature and radiation over the average (TEMP +2.6°C and RADPAR +13%). Biomass and the cropped arable land fraction CALF fell in all regions relative to the average of past 5 years. Again, the most anomalous situations occur in the Arid zone and Semi-arid zones, where BIOMSS decreased 28% (in both regions), and the largest CALF decrease (of about 20%) was observed in the arid zone. The NDVI development graphs for this period indicates that the condition of crops was unfavorable in all agro-ecological zones, especially during the period between December and January.

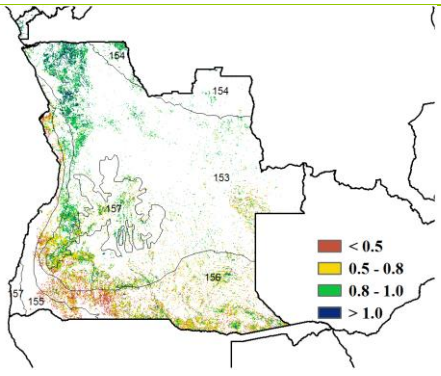
**Figure 3.6. Angola's crop condition, October 2018 - January 2019**



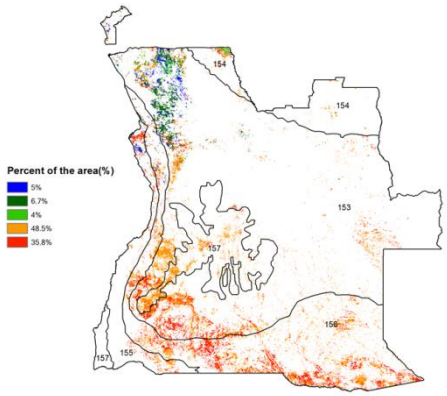

(a). Phenology of major crops



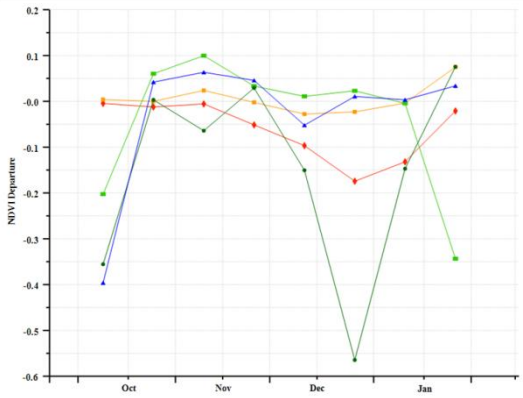

(b) Crop condition development graph based on NDVI



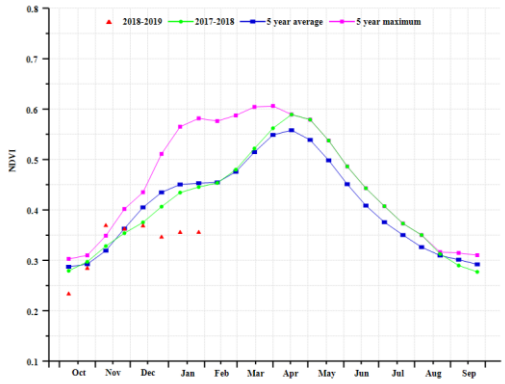

(c) Maximum VCI



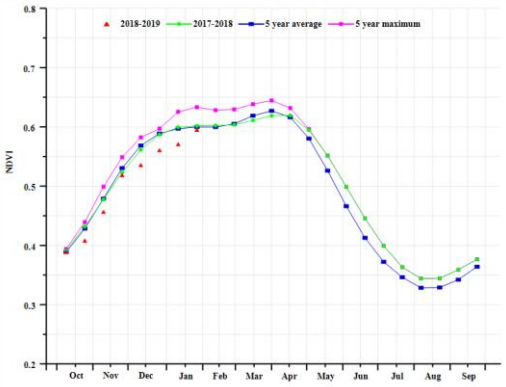

(d) Spatial NDVI patterns compared to 5YA



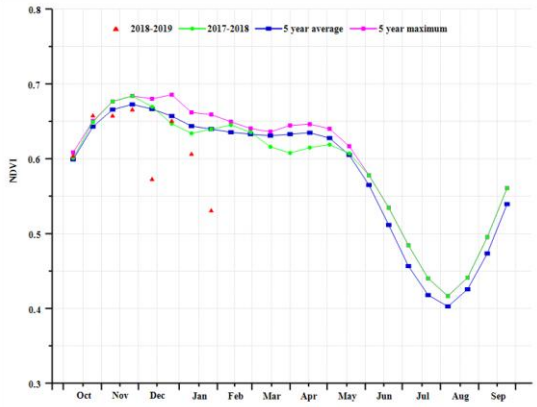

(e) NDVI profiles



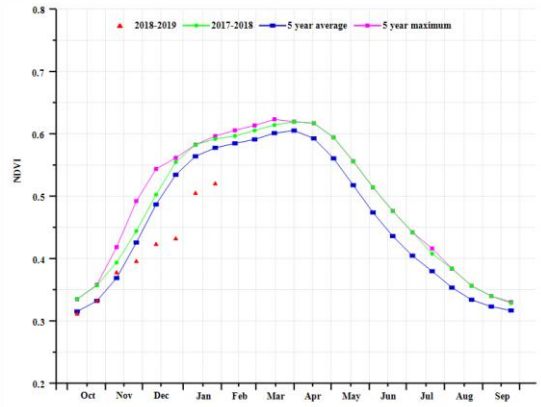

(f) Crop condition development graph based on NDVI - Sub-humid zone



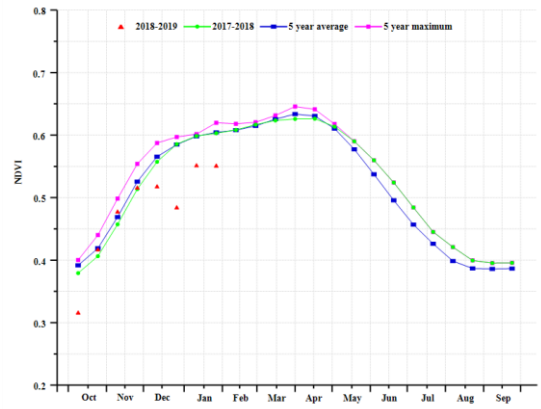

(g) Crop condition development graph based on NDVI - Humid zone




(h) Crop condition development graph based on NDVI - Arid zone




(i) Crop condition development graph based on NDVI - Semi-arid zone




(j) Crop condition development graph based on NDVI - Desert zone

**Table 3.3. Angola agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| **Arid Zone** | 121 | -40 | 24.9 | 0.0 | 1415 | 3 |
| **Desert zone** | 582 | -15 | 23.5 | 2.6 | 1269 | 13 |
| **Humid zone** | 670 | -4 | 25.4 | 0.1 | 1182 | 4 |
| **Semi-Arid Zone** | 281 | -37 | 27.4 | 1.6 | 1453 | 12 |
| **Sub-humid zone** | 502 | -15 | 25.6 | 1.3 | 1248 | 6 |

**Table 3.4. Angola agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Arid Zone** | 521 | -28 | 39 | -20 | 0.59 |
| **Desert zone** | 1617 | -12 | 91 | 2 | 0.88 |
| **Humid zone** | 2044 | -1 | 100 | 0 | 0.96 |
| **Semi-Arid Zone** | 971 | -28 | 81 | -1 | 0.74 |

# [ARG] Argentina

The reporting period covers harvesting of wheat, the main growing season of maize and rice, as well as the sowing for early and late soybean. For the whole country rainfall showed a positive anomaly of 29%.Temperature was reduced 1.3°C below average and RADPAR fell 8 %. BIOMSS showed an increment of 8 %. Overall crop condition was favorable during the monitoring period.

CropWatch subdivides Argentina into eight agro-ecological zones (AEZ) based on cropping systems, climatic zones, and topography; they are identified by numbers in the NDVI profiles map. Only four of them are found to be relevant for crops cultivation: the Chaco, Mesopotamia, the Humid Pampas, and the Subtropical highlands for which the crop conditions will be discussed with some detail in this section.

Spatial distribution of NDVI profiles shows a stable pattern with a low positive anomaly (close to 0.05) for Western Humid Pampas, Mesopotamia and East Chaco. Southern Humid Pampas and Dry Pampas showed no anomalies at the beginning of the reporting period and slight negative anomalies since December. The central and north-western Humid Pampas show an inhomogeneous spatial pattern, alternating areas with positive and negative anomalies in NDVI.

Crop condition development graphs for the whole country based on NDVI show changes from a positive anomaly at the beginning of the reporting period to negative values at the end; this pattern was also observed in the Humid Pampas. On the contrary, Chaco, Mesopotamia and Subtropical highlands showed persistently higher values than the 5 year average NDVI.

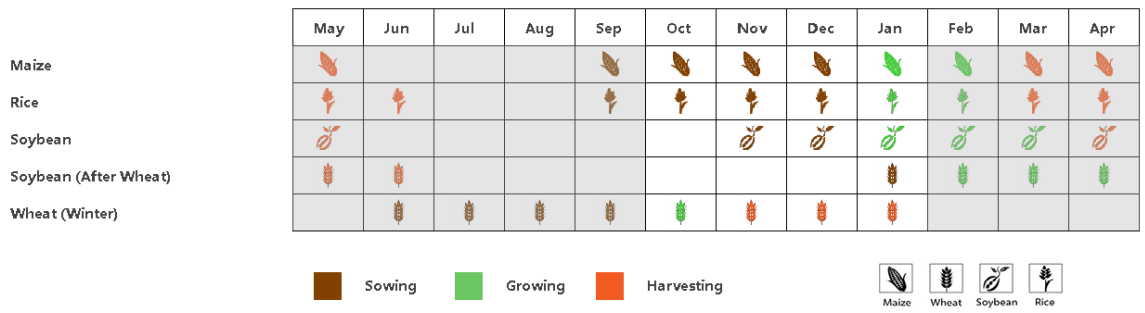
The VCIx map in general shows good crop condition with values above 0.8 in most of the area. Lower values are observed in central and western Humid Pampas, as well as in the western Chaco, Dry Pampas and Pampas hills.

**Regional analysis**

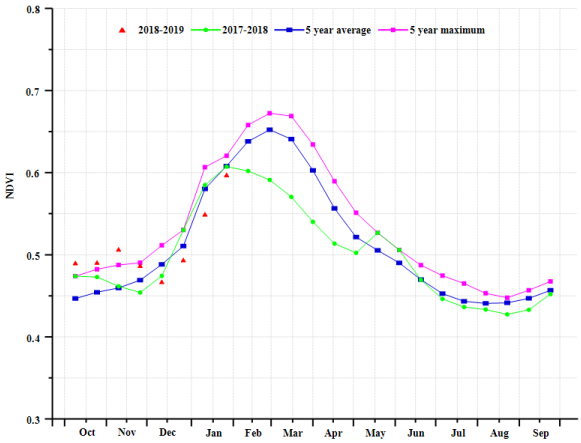
The four zones showed different behavior in RAIN. High positive anomalies were observed in Mesopotamia (+48 %), Humid Pampas (+31 %) and Chaco (+20 %), while a slight negative anomaly was observed in Subtropical highlands (-4 %). TEMP showed negative anomalies in the four zones, Subtropical highlands (-1.8°C), Humid Pampas (-1.5°C), Chaco (-1.1°C) and Mesopotamia (-1.0°C). Negative anomalies were also observed for RADPAR in Subtropical highlands (-13 %), Chaco (-11 %), Mesopotamia (-8 %), and Pampas (-6 %).

Three regions showed increments in BIOMSS: 10 % in Humid Pampas and Mesopotamia and 8 % in Chaco, while Subtropical highlands showed a reduction of 3 %. Maximum VCIx values were higher in Humid Pampas (0.92), followed by Mesopotamia (0.76), Subtropical highlands (0.75) and Chaco (0.74). According to CALF indicator, the 4 regions showed almost fully cropped areas, representing an increase over the five previous seasons of 16 % for Subtropical highlands, 9 % for Chaco, 7 % for Pampas and no change for Mesopotamia.

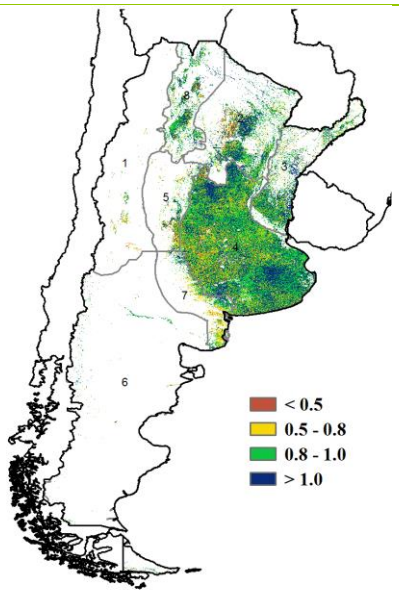
**Figure 3.7. Argentina's crop condition, October 2018 - January 2019**



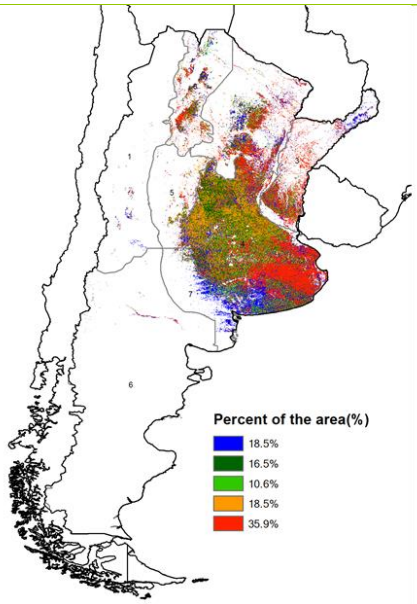

(a). Phenology of major crops



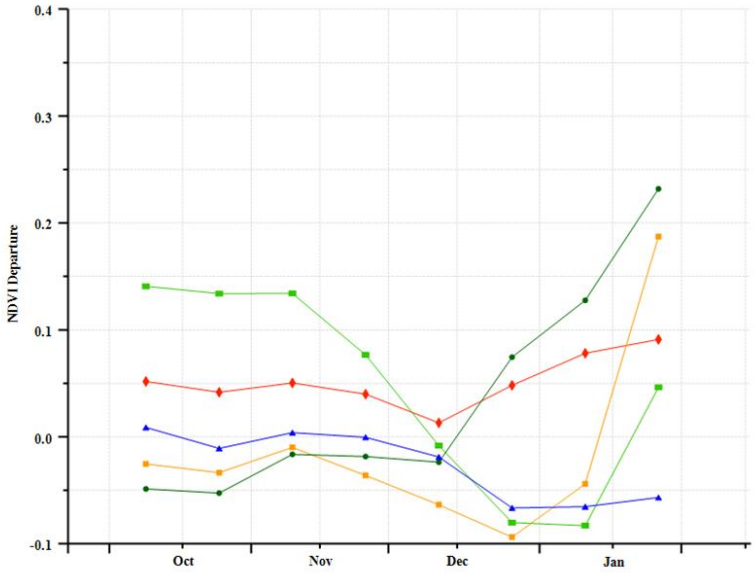

(b) Crop condition development graph based on NDVI



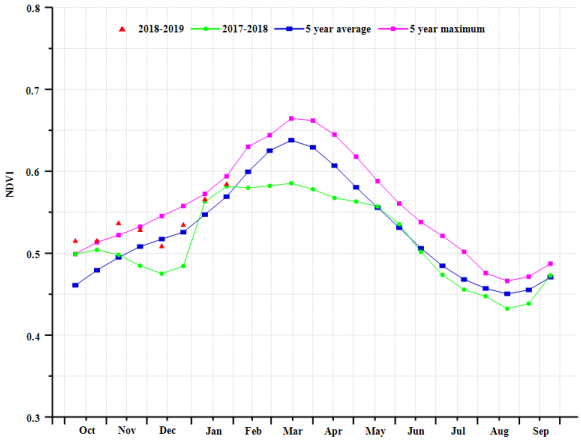

(c) Maximum VCI

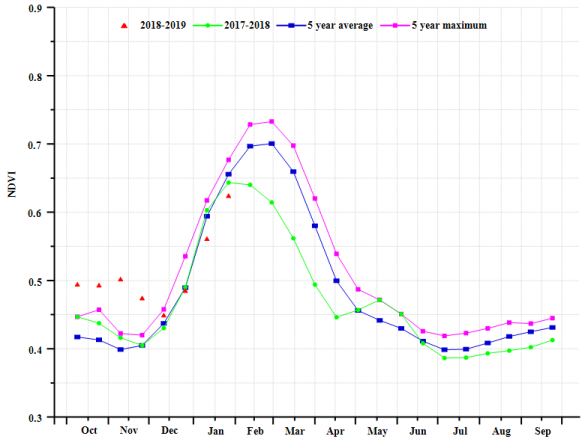



(d) Spatial NDVI patterns compared to 5YA

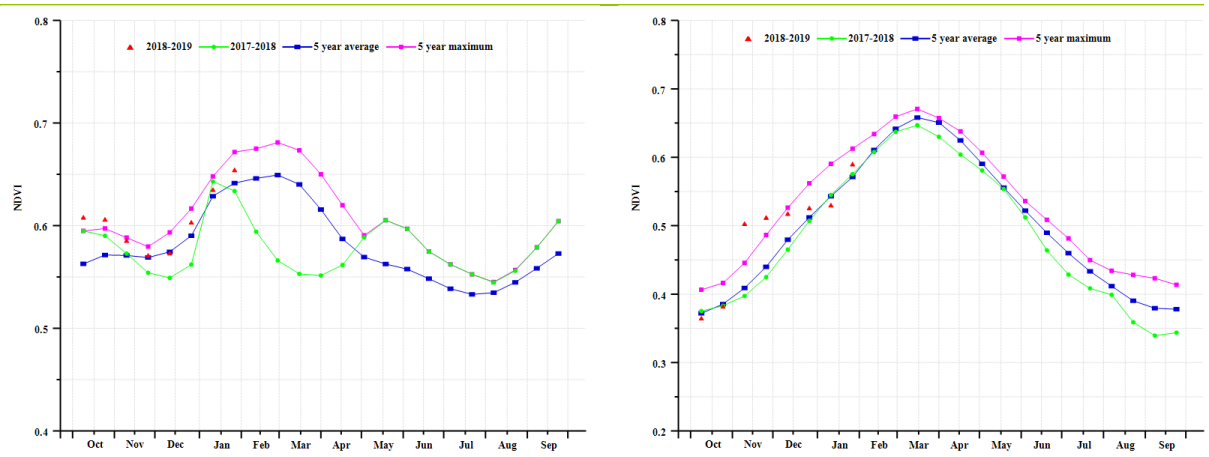



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Subtropical highlands (left) and Chaco region (right))




(g) Crop condition development graph based on NDVI (Pampas region (left) and Mesopotamia region (right))

**Table 3.5. Argentina's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Chaco | 637 | 20 | 24.9 | -1.1 | 1232 | -11 |
| Mesopotamia | 1087 | 48 | 23.3 | -1.0 | 1314 | -8 |
| Humid Pampas | 591 | 31 | 20.0 | -1.5 | 1432 | -6 |
| Subtropical highlands | 418 | -4 | 23.6 | -1.8 | 1203 | -13 |

**Table 3.6. Argentina's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Chaco | 1613 | 8 | 97 | 9 | 0.74 |
| Mesopotamia | 1894 | 10 | 100 | 0 | 0.76 |
| Humid Pampas | 1560 | 10 | 99 | 7 | 0.92 |
| Subtropical highlands | 1209 | -3 | 98 | 16 | 0.75 |

# [AUS] Australia

The main crops of Australia are wheat and barley, which are planted mainly from May to July and harvested from October to January. The monitored time period thus covers the harvest of wheat and barley. Based on spatial NDVI patterns and profiles, the crop condition was average from October to December, but dropped to below average in January. To be more specific: the south-eastern part of New South Wales and north-eastern part of Victoria show poor crop conditions with VCIx below 0.5, accounting for about 27.3% of the arable land. However, the south-western part of West Australia and the southern part of Victoria show above average condition from October to January with VCIx above 0.8, accounting for about 29.2% of the cropland. The CALF fell significantly by 19% below the last 5-year average. Below average production is expected for Australia in this season.

**Regional analysis**

This analysis adopts five agro-ecological regions for Australia, namely the South-eastern wheat zone, South-western wheat zone, Arid and semi-arid zone, Wet temperate and subtropical zone, and Sub-humid subtropical zone.

The crop condition in the **South-eastern wheat zone**, especially in the northern part showed below average crop condition at the start of the harvest in October. Most of the VCIx lies in the range below 0.5 with CALF decreasing markedly by 34%. Below average production is likely.

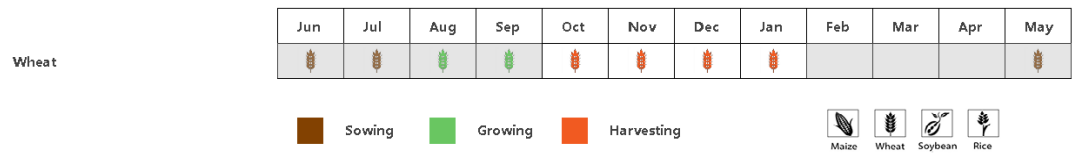
The crops in the **South-western wheat zone** show above average condition at this period of harvesting. The VCIx reaches 0.92 with CALF up 20%. Above average production is expected.

Crop condition in the **Arid and semi-arid zone** is generally average due to the average agro-climatic condition: rainfall +2%, temperature -0.1℃, RADPAR 2%. With VCIx at 0.69 and a CALF increase of 9%, average crop condition is likely.

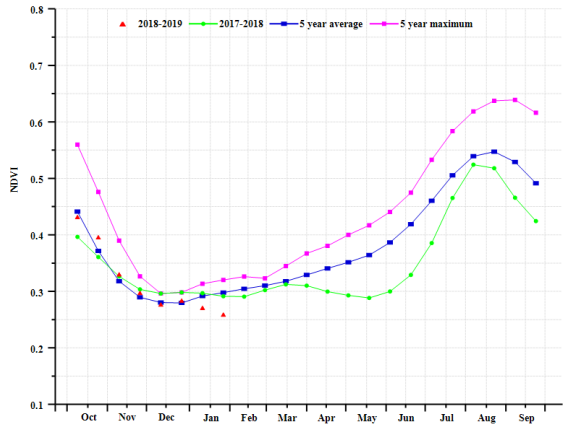
The **Wet temperate and subtropical zone** showed above average crop condition at the time of harvest in October, as rainfall and temperature were close to, but slightly above average (+4% and + 0.6℃, respectively). The VCIx of 0.77 indicates a generally average condition with stable CALF.

Crop condition in the **Sub-humid subtropical zone** was apparently below average throughout the season, possibly due to below average rainfall (-32%) and hot temperature (1.1℃ above average). Furthermore, CALF dropped significantly (57%) and VCIx of only 0.32, indicating very poor production for this AEZ.

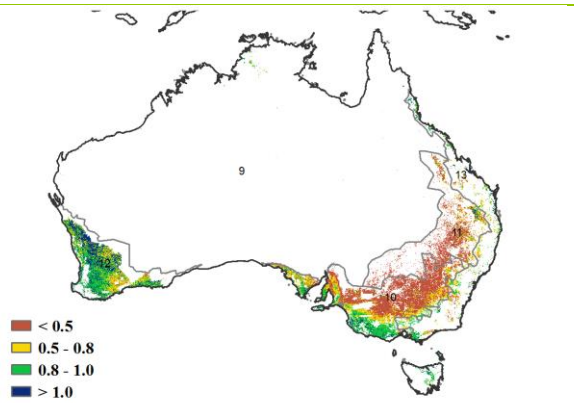
**Figure 3.8. Australia's crop condition, October 2018 - January 2019**



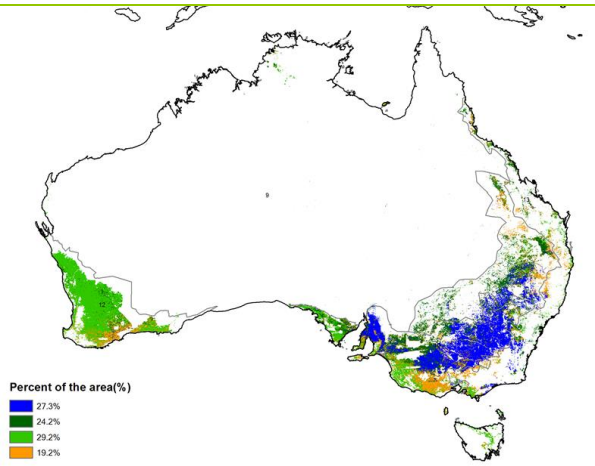

(a). Phenology of major crops



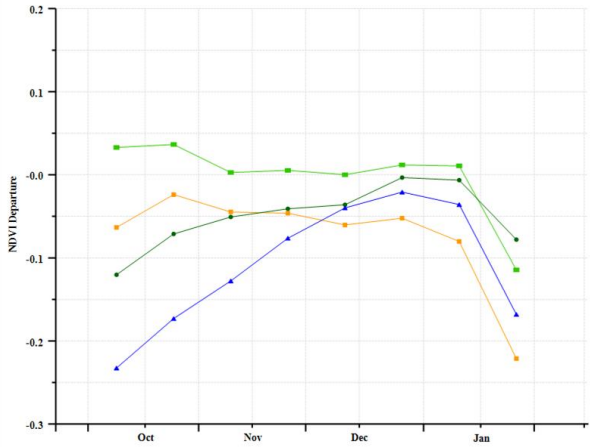

(b) Crop condition development graph based on NDVI



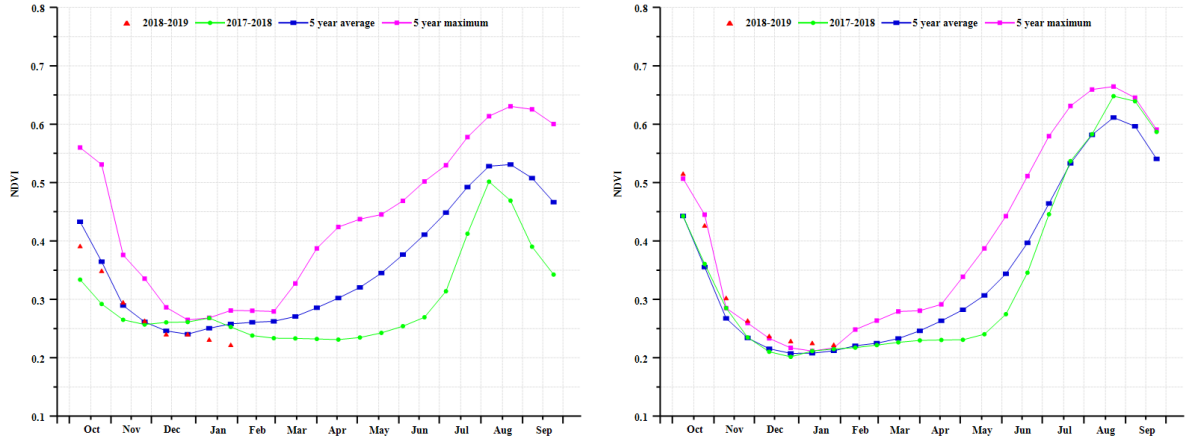

(c) Maximum VCI



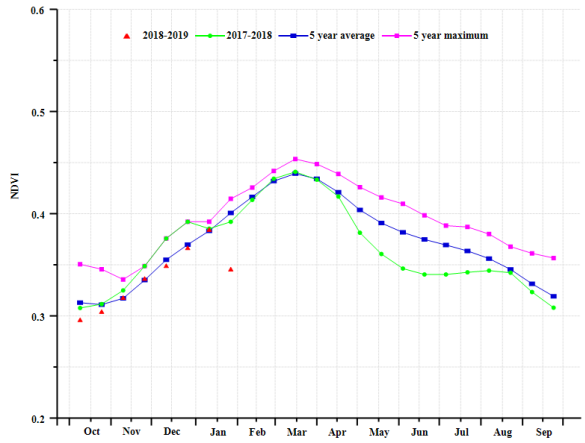

(d) Spatial NDVI patterns compared to 5YA

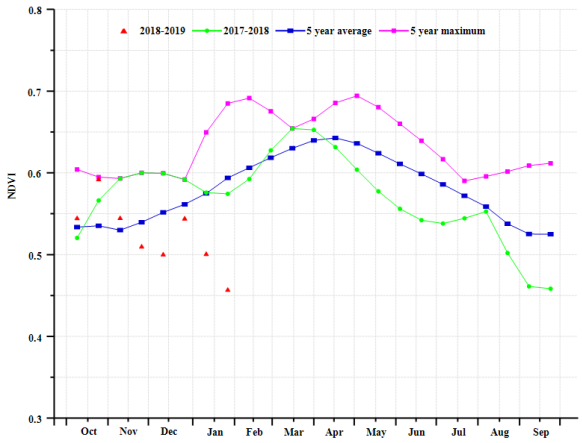



(e) NDVI profiles

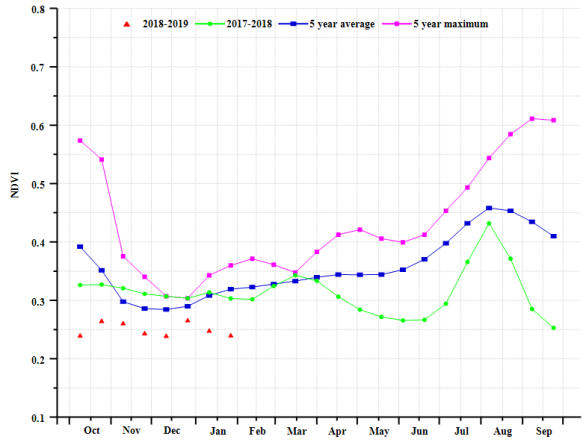



(f) Crop condition development graph based on NDVI (South-eastern wheat zone (left) and South-western wheat zone (right))




(g) Crop condition development graph based on NDVI (Arid and semi-arid zone (left) and Wet temperate and sub-tropical zone (right))




(h) Crop condition development graph based on NDVI (Sub-humid subtropical zone)

**Table 3.7. Australia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Southeastern wheat zone | 157 | 2 | 21.1 | 0.9 | 1475 | -1 |
| Southwestern wheat zone | 76 | -23 | 19.1 | -0.7 | 1511 | 0 |
| Arid and semiarid zone | 730 | 2 | 28.2 | -0.1 | 1388 | 2 |
| Wet temperate and subtropical zone | 355 | 4 | 21.1 | 0.6 | 1404 | 0 |
| Subhumid subtropical zone | 192 | -32 | 25.1 | 1.1 | 1570 | 4 |

**Table 3.8. Australia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Southeastern wheat zone | 692 | 5 | 48 | -34 | 0.48 |
| Southwestern wheat zone | 353 | -16 | 70 | 20 | 0.92 |
| Arid and semiarid zone | 1198 | -2 | 61 | 9 | 0.69 |
| Wet temperate and subtropical zone | 1031 | 1 | 96 | 0 | 0.77 |
| Subhumid subtropical zone | 733 | -24 | 17 | -57 | 0.32 |

# [BGD] Bangladesh

The growing and harvesting of Aman rice and sowing of irrigated dry season Boro rice and wheat were the main farming activities during the reporting period. The CropWatch indicators and overall crop condition were close to average except in January when they were lower than average. The country recorded 153 mm of RAIN, which is significantly below the average by 37 %. Temperature (22.4°C) was just below the average (-0.2°C), while sunshine was average. The overall biomass accumulation potential (BIOMSS) dropped 17% below the five-year average, while the crop arable land fraction (CALF) was close to average. The national NDVI profile was above the recent 5-year average in October, but from November to January, it stayed below the average curve.

In the Sylhet Division, the spatial NDVI profile remained above the average during October but fell below from November. In the other Divisions, the spatial NDVI profile remained below the average during the monitoring period. Over the whole country, the maximum VCI mostly ranged from 0.8 to 1, indicating good crop condition.

**Regional analysis**

Bangladesh includes four Agro-ecological zones (AEZ) referred to hereafter as Coastal region, Gangetic plain, the Hills and the Sylhet basin.

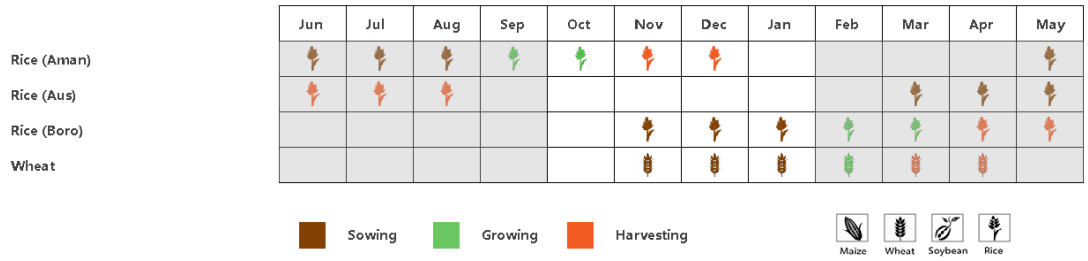
The Coastal region recorded 262mm of RAIN, 11% below average and TEMP and RADPAR were average at 23.2°C and 1036MJ/m2, respectively. BIOMASS exceeded the 5YA by 2%. The CALF value was average, and VCIx at 0.9 generally indicates good crop condition.

The Gangetic plain received low rainfall (73mm,64% below average), TEMP stayed average (22.2°C) and RADPAR was up 2 %. The CALF was average. With VCIx at 0.9 and BIOMASS 36% below the 5YA, a drop in production below the average can be expected.

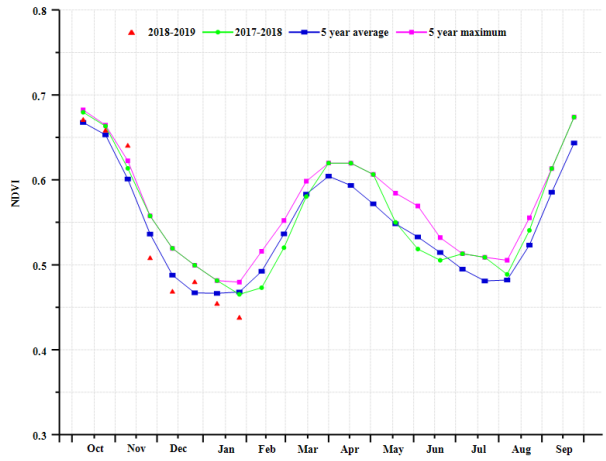
The precipitation in the Hills amounted to 401 mm (9% higher than average). TEMP was cooler by -0.9°C and RADPAR was just below (1% below). The BIOMASS reached 917 gDM/m2 and was 18 % above the 5YA. The CALF did not change relative to the 5YA, and VCIx was as high as 0.9, which indicates good crop condition.

The Sylhet basin recorded 86 mm, 61% below average, with average TEMP at 22.3°C and slightly above average RADPAR (976 MJ/m2 or +1%). The BIOMASS was beneath the average (-30%), but the CALF increased 7% above the 5YA, with the VCIx value at 0.9.

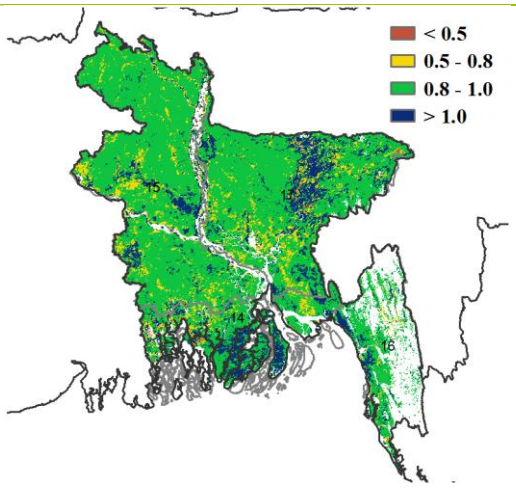
**Figure 3.9 Bangladesh's crop condition, October 2018 - January 2019.**



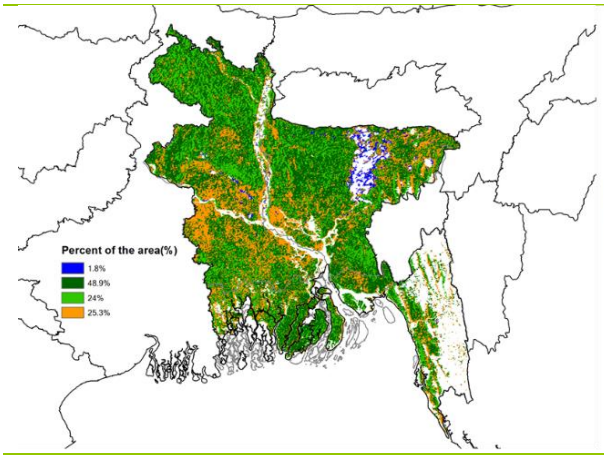

(a). Phenology of major crops



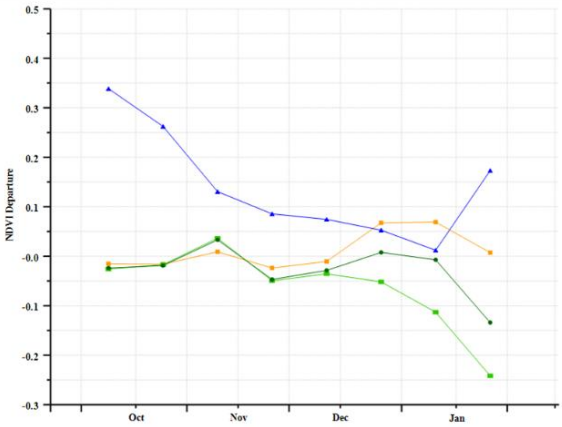

(b) Crop condition development graph based on NDVI



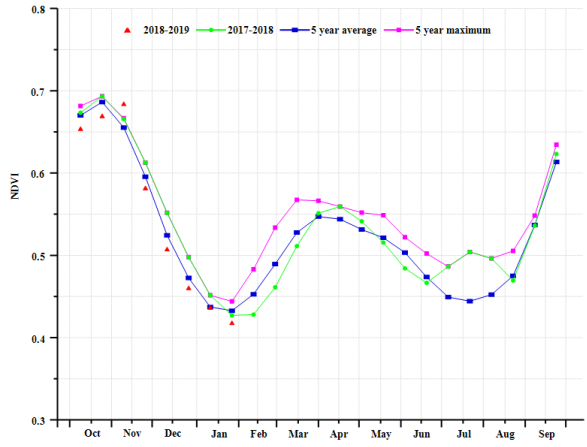

(c) Maximum VCI

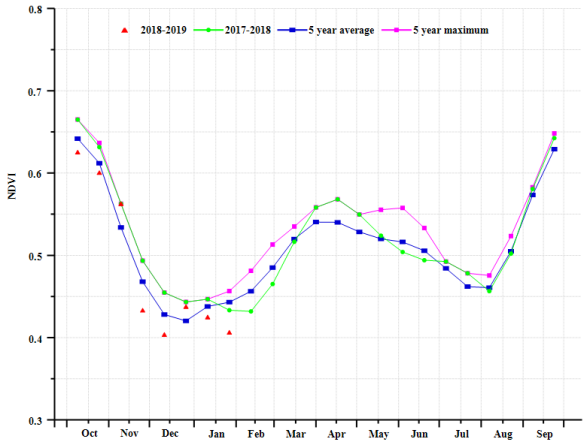



(d) Spatial NDVI patterns compared to 5YA

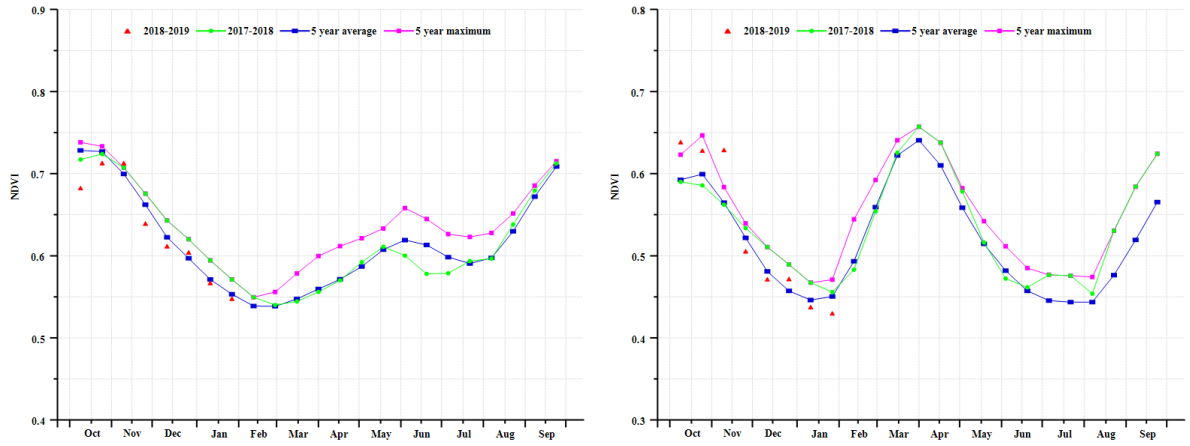



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Coastal Region (left) and Gangetic Region (right))




(g) Crop condition development graph based on NDVI (Hill Region (left) and Sylhet Basin (right))

**Table 3.9. Bangladesh's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Coastal region (Bangladesh) | 262 | -11 | 23.2 | 0 | 1036 | 0 |
| Gangetic plain (Bangladesh) | 73 | -64 | 22.2 | 0 | 987 | 2 |
| Hills (Bangladesh) | 401 | 9 | 22.2 | -0.9 | 1014 | -1 |
| Sylhet basin (Bangladesh) | 86 | -61 | 22.3 | 0 | 976 | 1 |

**Table 3.10. Bangladesh's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Coastal region (Bangladesh) | 675 | 2 | 100 | 2 | 0.94 |
| Gangetic plain (Bangladesh) | 316 | -36 | 100 | 2 | 0.91 |
| Hills (Bangladesh) | 917 | 18 | 100 | 0 | 0.92 |
| Sylhet basin (Bangladesh) | 370 | -30 | 100 | 7 | 0.93 |

# [BLR] Belarus

Winter wheat, which was sowed in October, is the major crop in the field during this monitoring period.

Agro-climatic conditions were generally stable as compared to average, except for a minor rainfall deficit but very sunny weather (RAIN 260 mm or -8.4%, TEMP 0.8℃ or +0.1℃ above average, RADPAR 181.8 MJ/m2 equivalent to a +12.6% anomaly). All the arable land was cropped (CALF at 100%) and the maximum vegetation condition index (VCIx) was high (0.98). As a result of good crop growth conditions, weather based projected biomass would increase by 7.2%. At the national level, the NDVI based crop condition development graph was gradually recovering to normal in January after a period in December when it was below both the 5-year average and the 2017-18 winter season values. According to the spatial distribution maps, VCIx was satisfactory in most areas of the country (>0.8). NDVI fluctuated very widely over the country; in the West (43.8% of cropped area), the value fell from 0.2 in late November to -0.4 at the end of January, a rather unusual behavior which will need close monitoring during the next reporting period

## Regional analysis

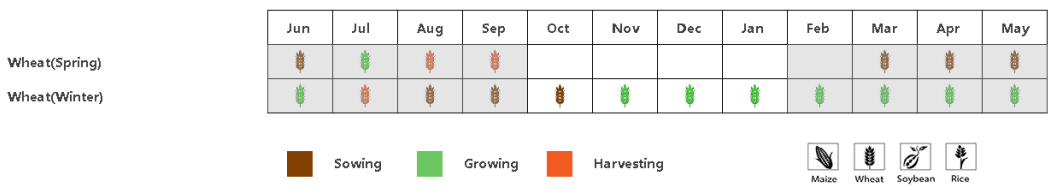
Based on cropping system, climatic zones and topographic conditions, regional analyses for four agro-ecological zones (AEZ) are provided, including Northern Belarus, Central Belarus and Southern Belarus.

Northern Belarus (Vitebsk, northern area of Grodno, Minsk and Mogilev) was short in rainfall (-12%) with normal temperature (+0.0℃) and abundant radiation (+16%). Biomass production should be 7% higher 5YA. Agronomic indicator show very satisfactory values: 100% for CALF and 0.95 for VCIx. Crop condition is good.

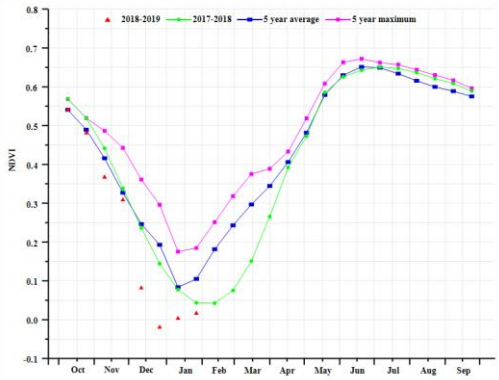
In Central Belarus, the Regions of Grodno, Minsk and Mogilev on average recorded rainfall 3% lower than reference values, but normal temperature (+0.1℃) and higher radiation (+11%). The BIOMSS is projected to increase 7%. Combined with fully cropped arable land (CALF at 100%) a VCIx value of 0.94 shows good prospects for winter crops. NDVI curve also showed a recovering trend since January. In summary overall situation was favorable for winter crops.

The Southern Belarus (southern halves of Brest and Gomel regions) experienced the same agro-climatic condition as Northern and Central area. Slightly low rainfall (-12%) has not adversely affected the crops. Other favorable agro-climatic conditions (TEMP +0.1℃, RADPAR +10%) and favorable agronomic indicators (CALF 99%, VCIx 0.91, BIOMSS up 6%) as well as rapidly recovering NDVI should ensure satisfactory crop production..

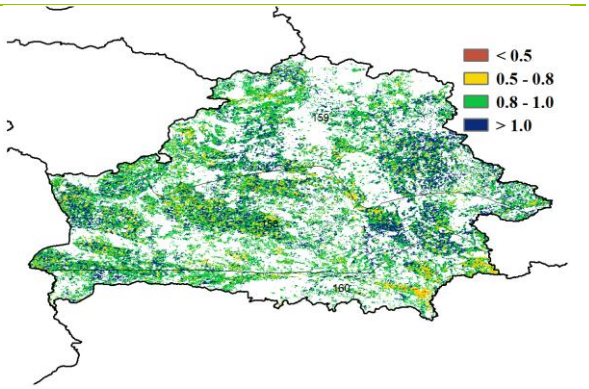
**Figure 3.10. Belarus's crop condition, October 2018 - January 2019**



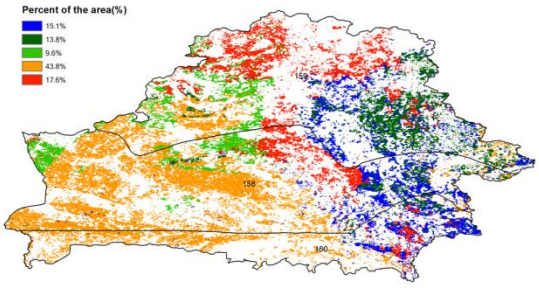

(a). Phenology of major crops



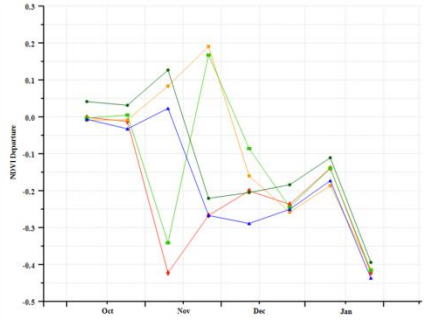

(b) Crop condition development graph based on NDVI



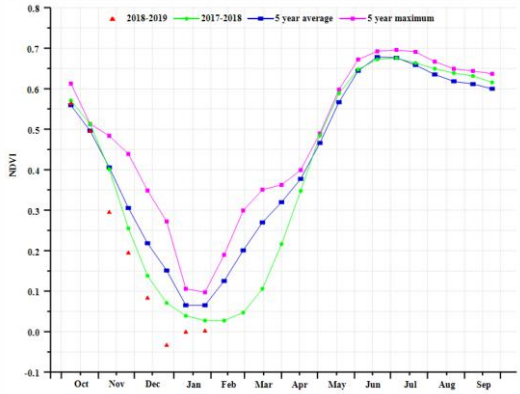

(c) Maximum VCI

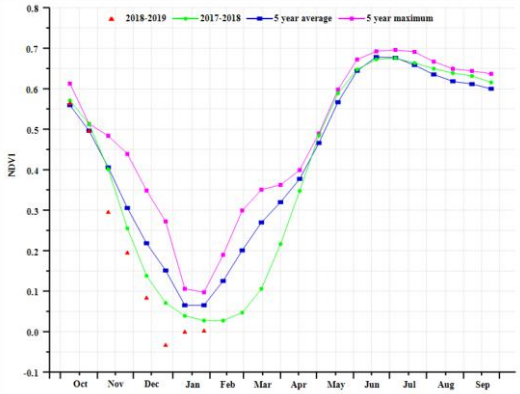



(d) Spatial NDVI patterns compared to 5YA

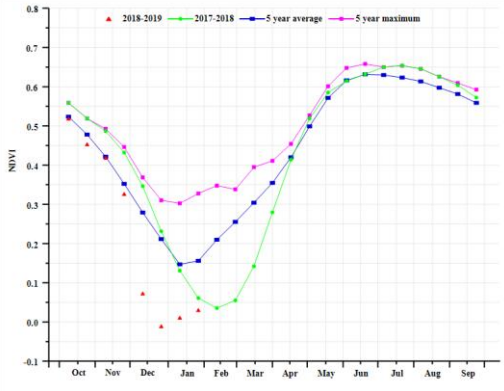



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Northern Belarus), and (Central Belarus).




(g) Crop condition development graph based on NDVI (Southern Belarus)

**Table 3.11. Belarus's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019.**

| Region | RAIN | TEMP | RADPAR |
|---|---|---|---|

| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
|---|---|---|---|---|---|---|
| Central Belarus | 273 | -3 | 1.1 | 0.1 | 186 | 11 |
| Northern Belarus | 256 | -12 | 0.2 | 0.0 | 168 | 16 |
| Southern Belarus | 237 | -12 | 1.4 | 0.1 | 207 | 10 |

Table 3.12. Belarus's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019.

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Central Belarus | 273 | -3 | 1.1 | 0.1 | 186 |
| Northern Belarus | 256 | -12 | 0.2 | 0.0 | 168 |
| Southern Belarus | 237 | -12 | 1.4 | 0.1 | 207 |

# [BRA] Brazil

The reporting period covers the sowing to early growth stages of maize, rice and soybean; in the North-East the harvest of wheat was concluded by the end of December. Generally, crop condition in Brazil was average compared to the previous five years.

Nationwide, agro-climatic indicators show average conditions with 1% lower rainfall, 0.5℃ lower temperature and RADPAR up 4% compared to average. According to the potential biomass model, the indicator is up 1% above average as a result of average meteorological conditions. Seasonal temperature and rainfall profiles also presents close to average values from October to January. Large positive rainfall anomalies and negative temperature departures are observed only during December. However, there are still significant differences between the nine major agricultural states: Rio Grande Do Sul and Ceara received sufficient rainfall at 13% and 67% above average, respectively; five states including Mato Grosso Do Sul, Parana, Sao Paulo, Minas Gerais, and Goias suffered from water shortages, with rainfall deficits of 16%, 14%, 14%, 13%, and 9% respectively. Rainfall in Mato Grosso and Santa Catarina was close to average. A significant anomaly was observed in Mato Grosso where temperature at 26.5 ℃ for the whole state was 1.2°C below average. For the five states with lowere rainfall mentioned above, crops received above average radiation ranging from +4% to +10%. Rainfall was the limiting factors for potential biomass as indicated by the similar amplitude of departures from average between RAIN and BIOMSS for most states.

The national NDVI development profile for Brazil presents close to average values throughout the reporting period. The stable NDVI development profiles confirm the beneficial impact of the abundant rainfall as mentioned in the previous bulletin. According to the NDVI departure clustering maps and profiles, vast areas of cropland in central-south Brazil present lower than average NDVI from December to early January. Those areas coincide with the five states with lower rainfall. However, according to the VCIx map, crops at peak stage during the monitoring period is still comparable to 5YA, reflecting limited effects of low rainfall to overall crop conditions. Another hotspot area is the east coastal areas where VCIx map also shows below 5YA average conditions with VCIx lower than 0.5. National VCIx is 0.95 and CALF is 2% above average which are indications of satisfactory production.

**Regional analysis**

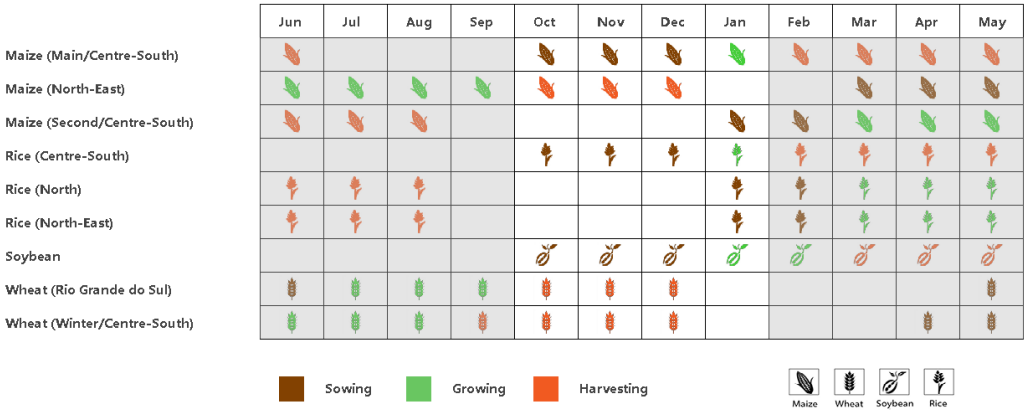
Based on cropping systems, climatic zones, and topographic conditions, eight agro-ecological regions are identified for Brazil. These include the central savanna, the east coast, Parana river, Amazon zone, Mato Grosso zone, subtropical rangeland zone, mixed forest and farmland, and the Nordeste. Over the recent reporting period, 4 zones received below average rainfall including Central Savanna, Coast, Mato Grosso, and Parana Basin; while other 4 zones including Amazonas, Northeastern mixed forest and farmland, Nordeste, and Southern subtropical rangelands received above average rainfall. Nordeste and Parana Basin are the only two zones with above average temperature. Most zones received average or above average radiation except for southern subtropical rangelands with 4% lower RADPAR. Considering rainfall and temperature, potential biomass is simulated and compared to previous 5YA. Northeastern mixed forest and farmland, Nordeste, and Southern subtropical rangelands presents well above average BIOMSS thanks to the above average rainfall. Coast zone presents largest negative departure from 5YA of BIOMSS and VCIx is also lowest among the eight zones. Also, only Coast zone presents lower than average cropped arable land fraction (CALF) (93%, 2% lower from 5YA).

Faovarable conditions in Northeastern mixed forest and farmland, Nordeste, and Southern subtropical rangelands resulted in above average crop condition as indicated by the NDVI based crop development profiles in the three zones. Accordingly, CALF over those zones are 1%, 49% and 1% above 5YA and VCIx are all above 0.9. It need to be highlighted that CALF in Nordeste is lowest at 85% among the zones, but still increases almost half from 5YA. Northeastern mixed forest and farmland zone is the only zone with VCIx higher than 1.02, indicating better than optimal conditions in the previous five years.

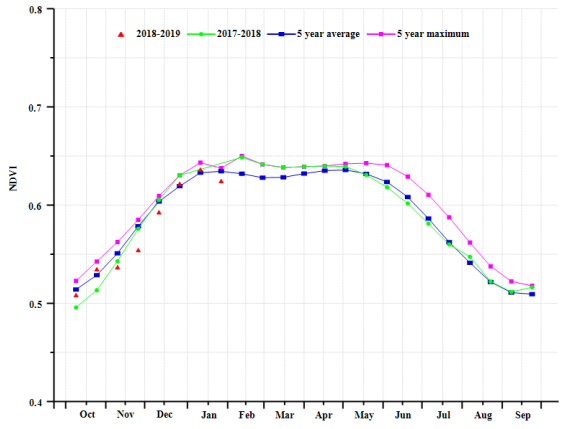
Below average crop condition are indicated by the lower than 5YA NDVI in the NDVI based development profiles in Central Savanna, Coast, Mato Grosso, and Parana Basin. Low rainfall potentially hampered the

crop developments in those zones. Considering the average or above average CALF and high VCIx values, CropWatch nevertheless assesses production prospects over the four zones as average.

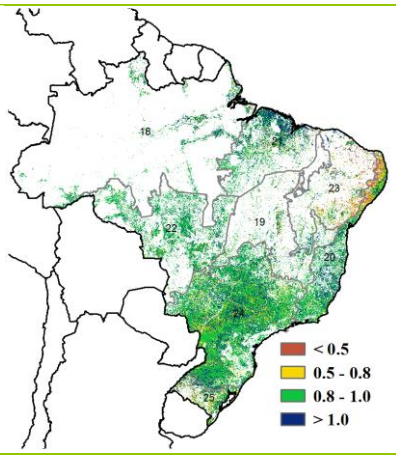
**Figure 3.11. Brazil's crop condition, October 2018 - January 2019**



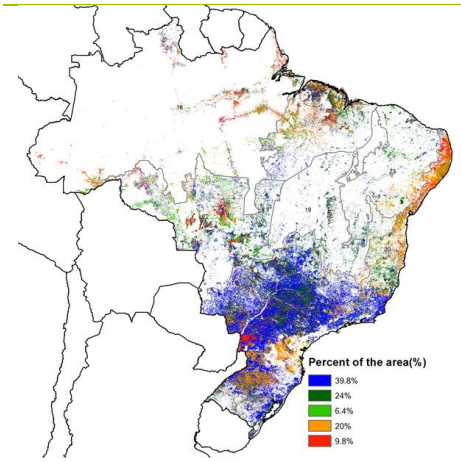

(a). Phenology of major crops



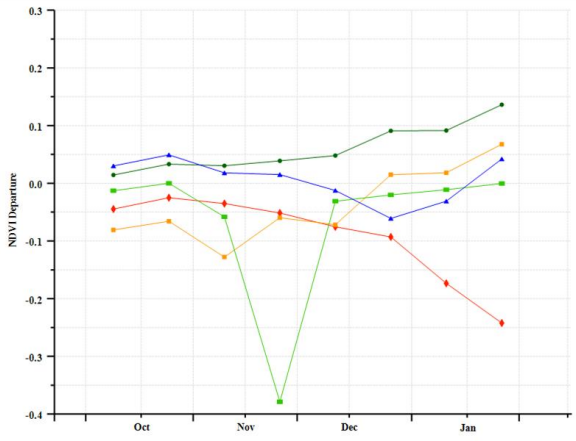

(b) Crop condition development graph based on NDVI



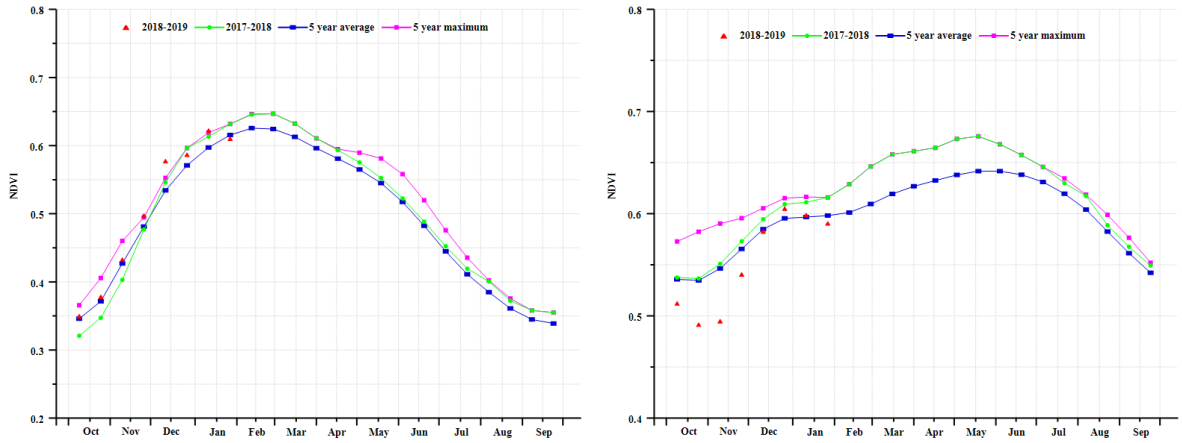

(c) Maximum VCI



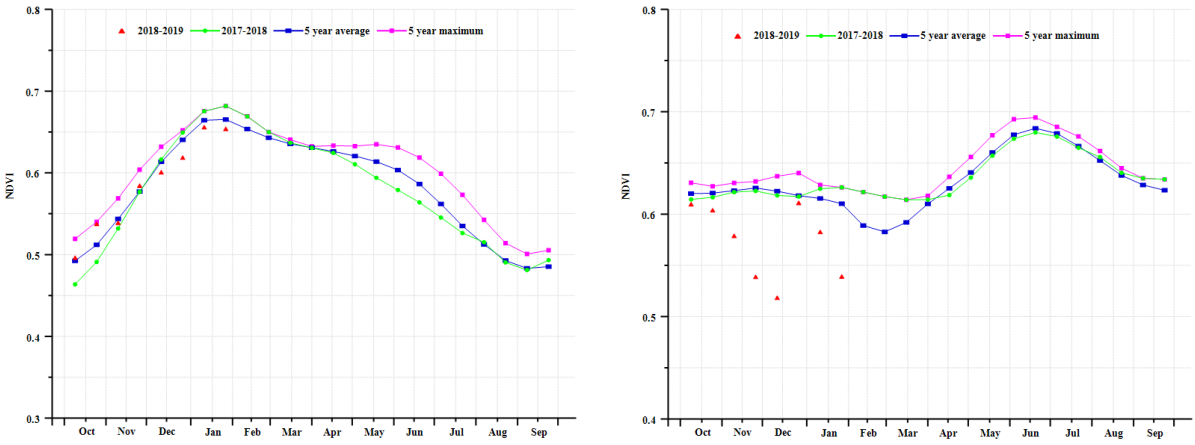

(d) Spatial NDVI patterns compared to 5YA



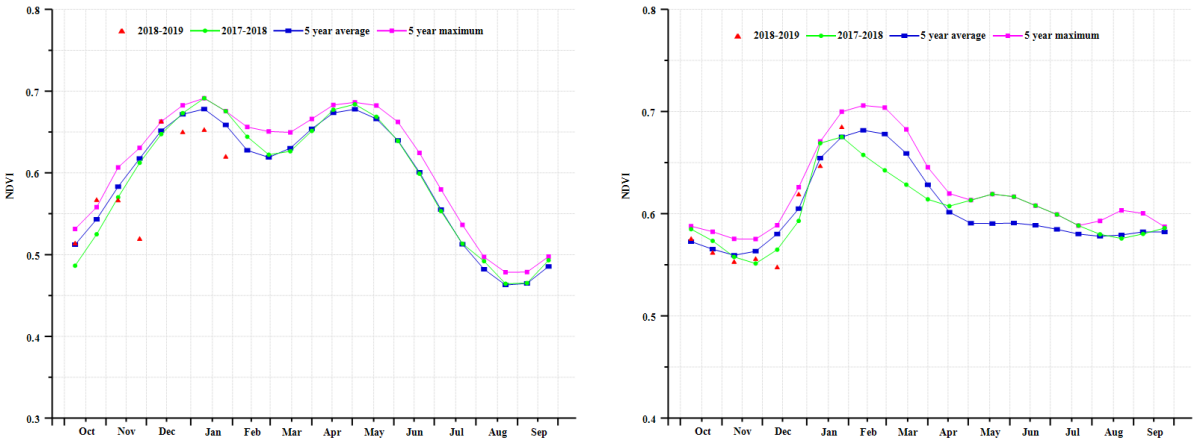

(e) NDVI profiles



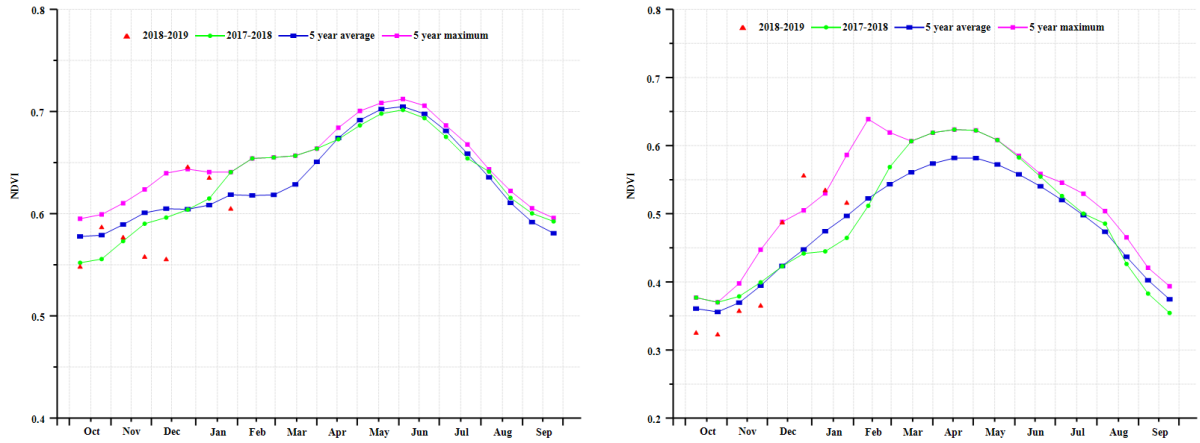

(e) Crop condition development graph based on NDVI ((Central Savanna) (left) and (East coast zone) (right))




(f) Crop condition development graph based on NDVI (Parana River (left) and Amazonas (right))




(g) Crop condition development graph based on NDVI (Mato Grosso region (left) and Sub-tropical rangeland (right))




(h) Crop condition development graph based on NDVI (Mixed forest and farmland (left) and (Brazil Nordeste)(right))

**Table 3.13. Brazil's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Amazonas | 742 | 7 | 27.6 | -0.8 | 1167 | 0 |
| Central Savanna | 665 | -7 | 26.2 | -0.6 | 1311 | 5 |
| Coast | 484 | -12 | 25.5 | -0.2 | 1306 | 4 |
| Northeastern mixed forest and farmland | 795 | 24 | 27.6 | -1.2 | 1226 | 3 |
| Mato Grosso | 929 | -3 | 26.6 | -1.1 | 1206 | 7 |
| Nordeste | 328 | 13 | 28.5 | 0.3 | 1354 | 1 |
| Parana basin | 714 | -10 | 24.7 | 0.1 | 1360 | 6 |
| Southern subtropical rangelands | 832 | 18 | 23.3 | -0.4 | 1350 | -4 |

**Table 3.14. Brazil's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Amazonas | 1754 | 3 | 100 | 1 | 0.99 |
| Central Savanna | 1720 | -3 | 99 | 7 | 0.97 |
| Coast | 1165 | -8 | 93 | -2 | 0.91 |
| Northeastern mixed forest and farmland | 1839 | 15 | 100 | 1 | 1.02 |
| Mato Grosso | 2266 | 0 | 100 | 0 | 0.97 |
| Nordeste | 915 | 15 | 85 | 49 | 0.93 |
| Parana basin | 1926 | -2 | 100 | 0 | 0.95 |
| Southern subtropical rangelands | 1746 | 8 | 100 | 1 | 0.94 |

# [CAN] Canada

The current reporting period covers the harvest of summer crops, and the sowing of winter wheat in Canada. Most agricultural areas were covered in snow from November, which limited the relevance of NDVI-based indicators.

Nationwide, rainfall was +6% above average, which has increased soil moisture storage for winter wheat. Both temperature and radiation were slightly below average (TEMP -0.2°C, RADPAR -1%) and the maximum VCI value was 0.71. The potential biomass accumulation index was below the recent five-year average (BIOMSS -12%) as well as CALF (-15%). In the three main winter wheat Provinces, RAIN was below average (Alberta -13%, Manitoba -14%, Saskatchewan -20%), which could lead to drop in the biomass production potential compared to the last 5 years (Alberta -2%, Manitoba -24%, Saskatchewan -14%).

NDVI values from November to January were all lower than 0.15, which was probably caused by the snow, which limits the relevance of NDVI-based indicators for current reporting period.

Although rainfall in the whole country was above the average, the conditions were not favorable in the three main production provinces, which could result in a water deficit to winter wheat. The production may be worse than during 2018 if the low rainfall continues.

**Regional analysis**

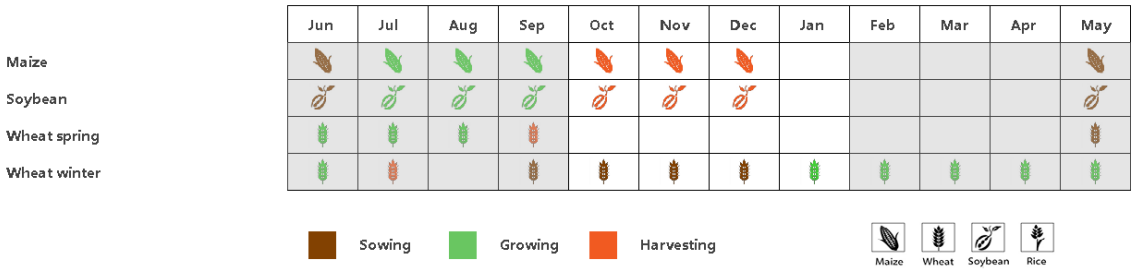
The Prairies (area identified as 30 in the VCIx map) and Saint Lawrence basin (26, covering Ontario and Quebec) are the major agricultural regions.

In the Prairies, the main food production area in Canada, rainfall was below average (146mm or -14%), the temperature was slightly above the average (+0.6°C) while the radiation was average. The potential biomass was below the five-year average (BIOMSS, -10%). Because of snow, the Cropped Arable Land Fraction dropped significantly (CALF, -30%), the VCIx was 0.64, and the NDVI was largely below the average from November to December, while only slight below the average in January. The crop production of 2019 in this region could be unfavorable if deficit rainfall continues.

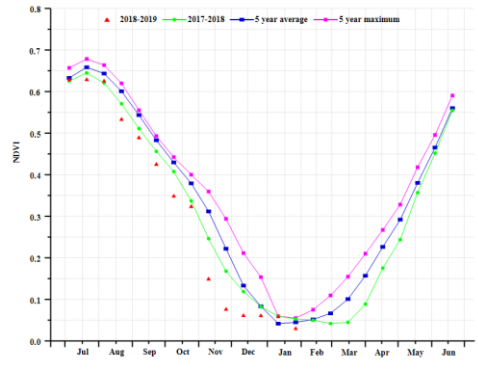
In the Saint Lawrence basin region, rainfall was above average of last 15 years (421 mm equivalent to +32%), both the temperature and radiation were below average (TEMP, -1.5°C; RADPAR, -5%). The potential biomass was largely below the average of last 5 years (BIOMSS, -17%), CALF was average and VCIx was 0.89. The NDVI profiles were similar to the Prairies region. The production of winter wheat in this region could be favorable if the sufficient rainfall continues.

Overall, the large rainfall deficit in the three main production provinces could lead to a drop in crop production if unfavorable environmental conditions continue in Canada.

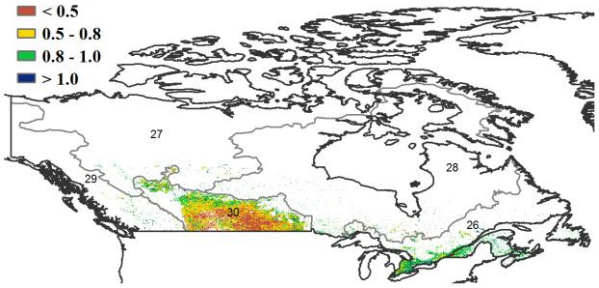
**Figure 3.12. Canada's crop condition, October 2018 - January 2019**



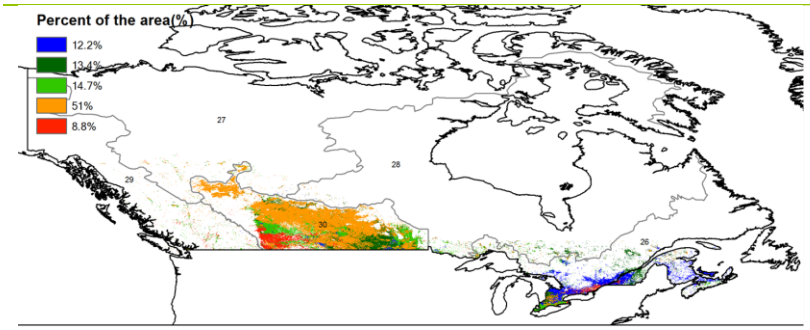

(a). Phenology of major crops



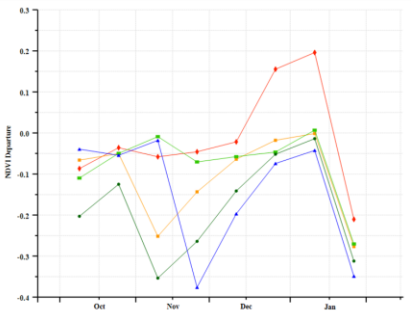

(b) Crop condition development graph based on NDVI



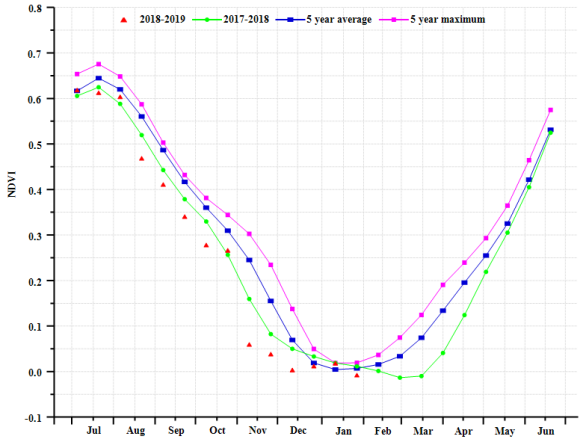

(c) Maximum VCI

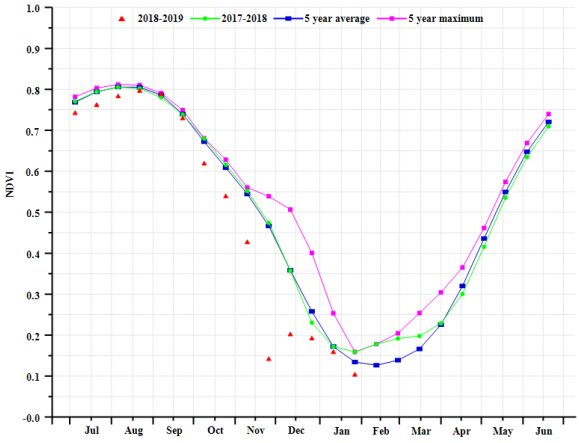



(d) Spatial NDVI patterns compared to 5YA




(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Canadian Prairies region (left) and Saint Lawrence basin region (right))

**Table 3.15. Canada's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Saint Lawrence basin (Canada) | 421 | 32 | -3.6 | -1.5 | 304 | -5 |
| Prairies (Canada) | 146 | -14 | -6.0 | 0.6 | 287 | 0 |

**Table 3.16. Canada agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Saint Lawrence basin (Canada) | 521 | -17 | 99 | 0 | 0.89 |
| Prairies (Canada) | 408 | -10 | 27 | -30 | 0.64 |

# [DEU] Germany

Crops in Germany showed spatially diverse condition during the reporting period, which covered the late stages of sugar beets (October harvest) and early vegetative stages of winter wheat and winter barley. For the country as a whole, total precipitation (as measured by the RAIN indicator) was 6% below average, temperature was above average (TEMP, +0.7°C), and radiation was above average as well (RADPAR, +6%). Negative rainfall departures occurred mostly from early to mid-October, November, mid-December and after mid-January, while above average rainfall occurred throughout the country in late October, late November and late December. Temperatures were above average over most of Germany (+0.7°C) with peaks in late October, late November, mid-December and late January. Due to favorable temperature, the biomass production potential (BIOMSS) is expected to increase by 4% nationwide compared to the five-year average.

According to the national crop condition development graph, NDVI was affected by snow, resulting in values being below average during the whole reporting period, except in late November. These observations are confirmed by the spatial NDVI profiles. VCIx was low in some regions, but the average for Germany as a whole reached 0.91 over this reporting period. The snow has probably protected crops from cold weather and will continue to provide soil moisture. The outlook of winter crops is above average.

**Regional analysis**

Based on cropping systems, climatic zones, and topographic conditions, six sub-national regions can be distinguished for Germany. The ones which are most relevant for crops cultivation are the Northern wheat zone, North-west mixed wheat and sugar beets zone, and the Central wheat zone. Numbers identify the areas on the maps.

**Schleswig-Holstein and the Baltic coast** is the major winter wheat zone of Germany. The CropWatch agroclimatic indicators show that this region experienced a precipitation deficit (-20%) with warm weather (TEMP, +0.9°C) and radiation above average (RADPAR, +9%). With suitable temperature, biomass (BIOMSS) in this zone is expected to increase by 4% compared to the five-year average. Due to snow storms, NDVI started dropping from January. The area has a high CALF (100%) as well as a favorable VCIx (0.97), indicating favorable crop prospects.

Wheat and sugar-beets are major crops in the **Mixed wheat and sugar-beets zone of the north-west**. The CropWatch agroclimatic indicator RAIN was below average (-11%), temperature was above (TEMP +0.6°C) and so was radiation (RADPAR, +7%). Biomass (BIOMSS) in this zone is expected to increase by 4% compared to the five-year average with suitable temperature and radiation condition. As shown in the crop condition development graph based on NDVI, the values were above average after mid-November. The area has a high CALF (100%) and crop condition for the region is good according to the high VCIx (0.91).

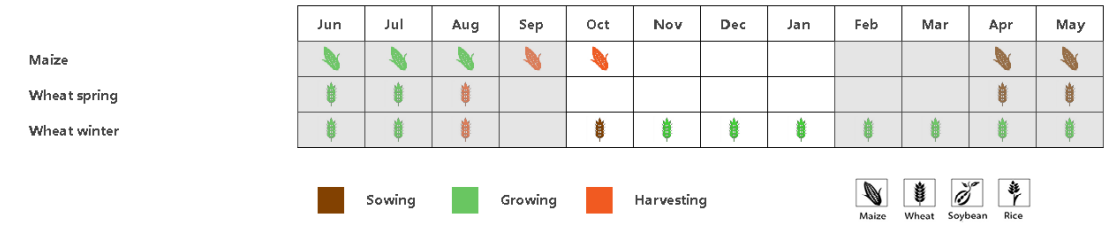
**Central wheat zone of Saxony and Thuringia** is another major winter wheat zone; it recorded about 11% below average rainfall and experienced warmer than average weather (TEMP +0.7°C) and good sunshine (RADPAR +6%). The biomass production potential (BIOMSS indicator) was average. The area has a high CALF (99%) and the VCIx of 0.85 for this region also shows favorable crop prospects.

The cropland in the **Sparse crop area of the east-German lake and Heathland** and **Western sparse crop area of the Rhenish massif** was more marginal. Dry weather was recorded in the second (RAIN -3% and -12%, respectively), as well as above average temperatures (+1.0°C and +0.6°C) and radiation (RADPAR +7% and +6%). Compared to the average of the last five years, BIOMSS was higher by 5% and 1%, respectively, while the Cropped Arable Land Fraction was at 99% and 95%. As shown in the crop condition development graph based on NDVI, the values in both regions were all below average during the whole reporting period, showing unfavorable crop prospects for the regions.

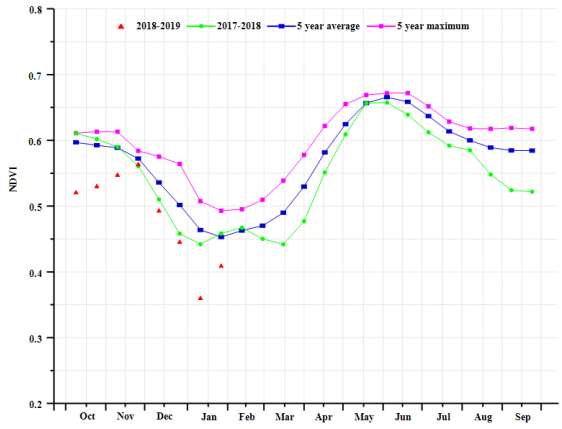
Next to wheat, two summer crops (maize and potato) are the major crops on the **Bavarian Plateau**. The CropWatch agroclimatic indicators were slightly above average (RAIN +8%, TEMP +0.6°C, RADPAR +5%). Compared to the five-year average, BIOMSS increased 6%. The area has a high CALF (99%) as well as a

favorable VCIx (0.92), indicating high cropped area and favorable winter crop prospects.

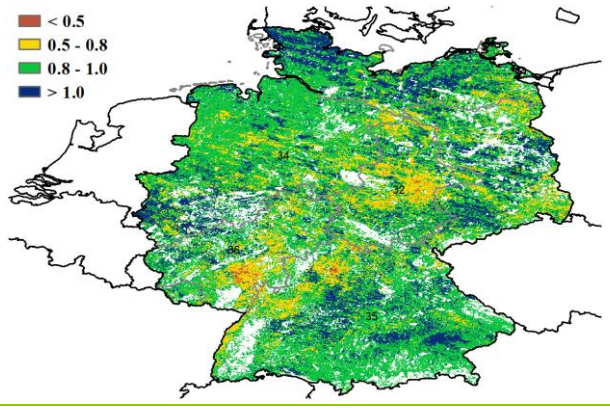
**Figure 3.13. Germany's crop condition, October 2018 - January 2019**



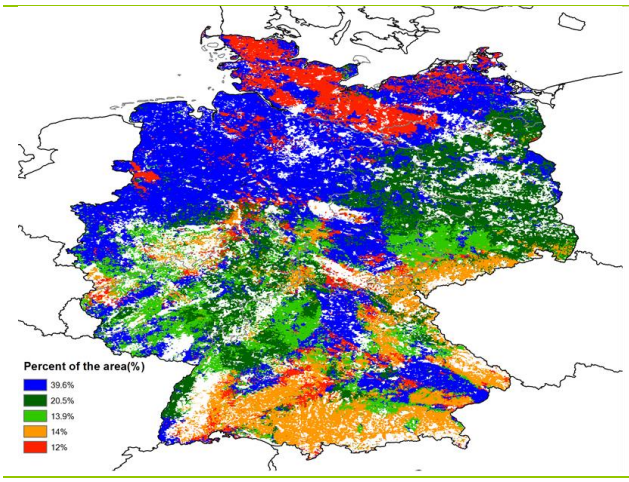

(a). Phenology of major crops



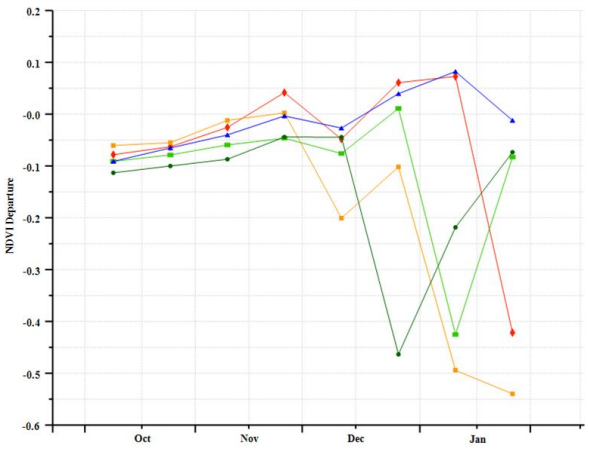

(b) Crop condition development graph based on NDVI



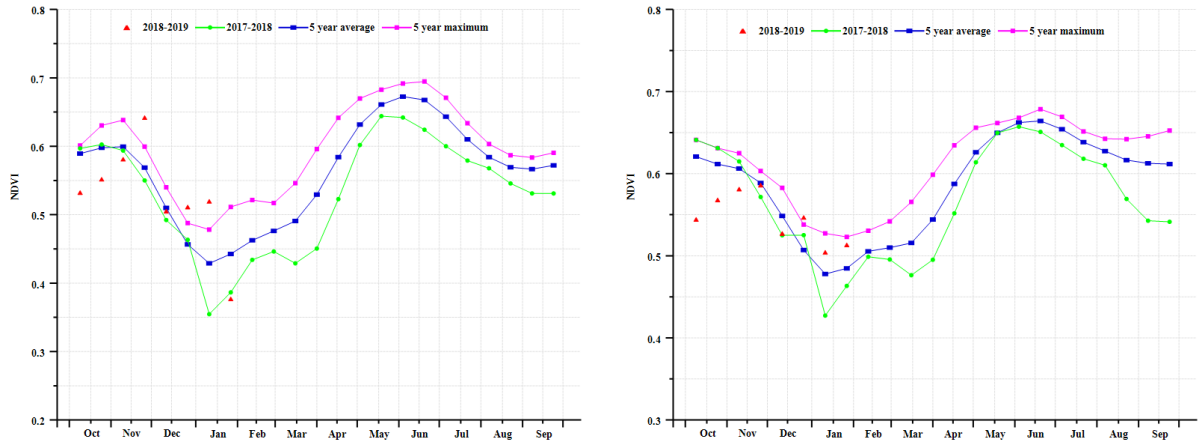

(c) Maximum VCI



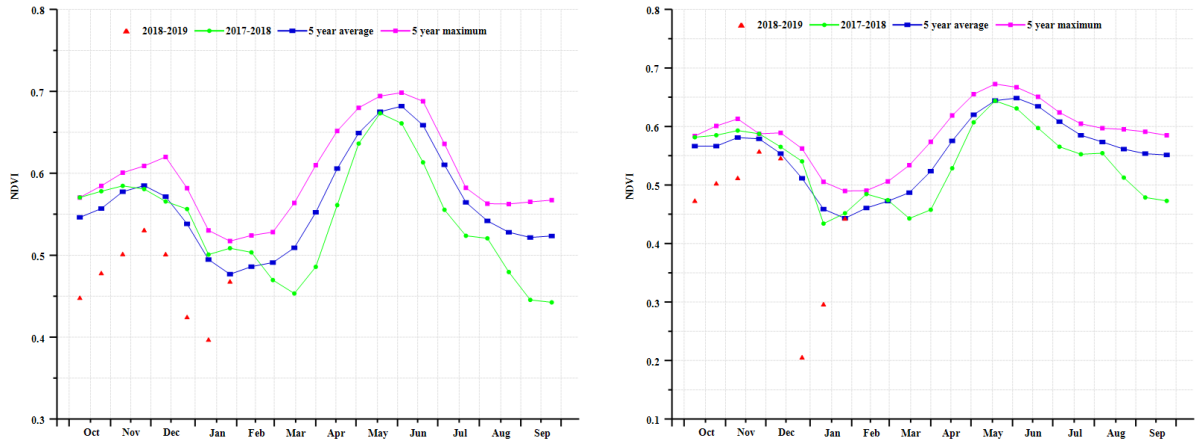

(d) Spatial NDVI patterns compared to 5YA



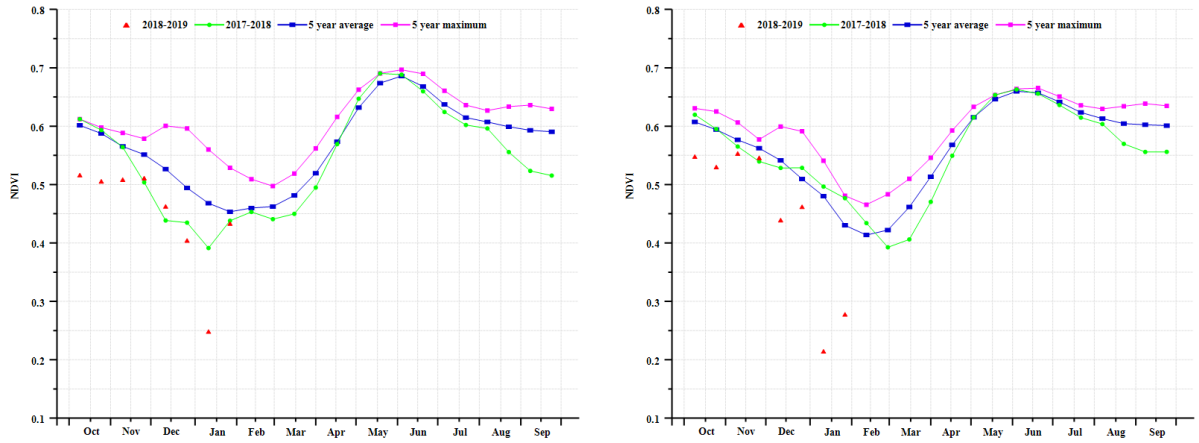

(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Wheat zone of Schleswig-Holstein and the Baltic coast (left) and Mixed wheat and sugar beets zone of the north-west(right))




(g) Crop condition development graph based on NDVI (Central wheat zone of Saxony and Thuringia(left) and Sparse crop area of the east-German lake and Heathland (right))




(h) Crop condition development graph based on NDVI (Western sparse crop area of the Rhenish massif (left) and Bavarian Plateau (right))

**Table 3.17. Germany's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| **Wheat zone of Schleswig-Holstein and the Baltic coast** | 266 | -20 | 6.2 | 0.9 | 190 | 9 |

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Mixed wheat and sugarbeets zone of the north-west | 304 | -11 | 6.3 | 0.6 | 214 | 7 |
| Central wheat zone of Saxony and Thuringia | 251 | -11 | 5.5 | 0.7 | 232 | 6 |
| Sparse crop area of the east-German lake and Heathland | 276 | -3 | 5.4 | 1.0 | 229 | 7 |
| Western sparse crop area of the Rhenish massif | 253 | -12 | 5.5 | 0.6 | 243 | 6 |
| Bavarian Plateau | 315 | 8 | 4.2 | 0.6 | 302 | 5 |

**Table 3.18. Germany's agronomic indicators by sub-national regions, current season's value and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Wheat zone of Schleswig-Holstein and the Baltic coast | 1069 | 4 | 100 | 0 | 0.97 |
| Mixed wheat and sugarbeets zone of the north-west | 1089 | 4 | 100 | 0 | 0.91 |
| Central wheat zone of Saxony and Thuringia | 955 | 0 | 99 | -1 | 0.85 |
| Sparse crop area of the east-German lake and Heathland | 1007 | 5 | 99 | 0 | 0.91 |
| Western sparse crop area of the Rhenish massif | 982 | 1 | 95 | -4 | 0.86 |
| Bavarian Plateau | 946 | 6 | 99 | -1 | 0.92 |

# [EGY] Egypt

During the reporting period the summer crops such as maize and rice were harvested, and the winter wheat was sown and started growing. The CropWatch agro-climatic indicators show that RAIN and TEMP were 3% and 0.5°C below the average, respectively. RADPAR, which is the main limiting factor for crop conditions in Egypt since almost all crops are irrigated, was average. The estimated BIOMSS was 23% above the average and Maximum VCI was 1.

The nationwide NDVI profile shows average crop condition until the end of December; it then dropped to be below the 5 year-average until the end of January. This is confirmed by spatial NDVI patterns: average until the mid of December, a rise above average in 38% of the cropped areas, a drop in 20% of cropland and average condition elsewhere (42%). The change in crop conditions after mid-December corresponds to the switch between winter and summer crops in Egypt. Hence, this change may be due to the annual variation in crops geographical distribution or planting dates between regions. Overall, All CropWatch indicators, as well as the maximum VCI map, indicate favorable crops condition nationwide.

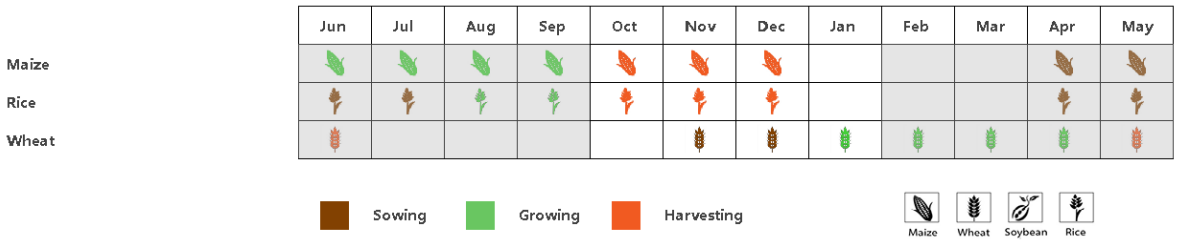
**Regional analysis**

Egypt can be subdivided into three agro-ecological zones (AEZ) based mostly on cropping systems, climatic zones, and topographic conditions. Only two of them are relevant for crops: the Nile Delta and Mediterranean coastal strip and the Nile Valley.

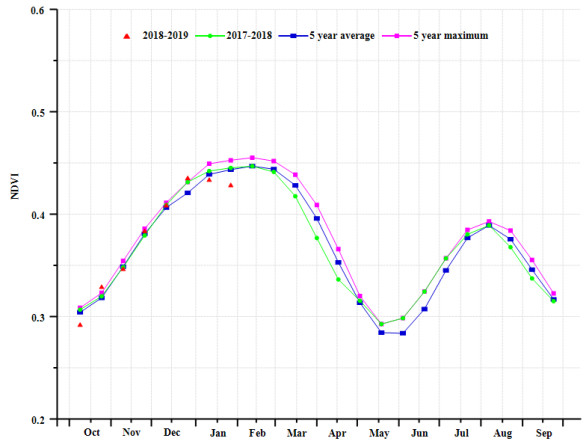
The Rainfall was slightly (4%) below average in the first AEZ, but significantly above (48%) in the Nile Valley. The TEMP in both zones was below average (by 0.6 and 0.4 °C, respectively). RADPAR average in both zones, while the estimated BIOMSS was higher in the Nile Valley (63% above the average) than in the Nile Delta and Mediterranean coastal strip (7% above the average). This increase of BIOMSS in the Nile Valley can be attributed to the increase of the rainfall at this zone during the reporting period. Since most of the agricultural lands in Egypt are irrigated, the rainfall makes little change in the outcome of the season. However, additional water usually has a beneficial effect. Also, both CALF and VCIx estimated for Nile valley were higher (14% above the average and 1.2, respectively) than for the Nile Delta and Mediterranean coastal strip zone (7% above the average and 1 respectively).

The NDVI-based crop condition development graphs indicate average conditions in the Nile Delta and Mediterranean coastal strip zone, and slightly above-average conditions in the Nile valley during the period from mid-October to the end of December. Later in the season, NDVI dropped slightly below the average in both AEZs.

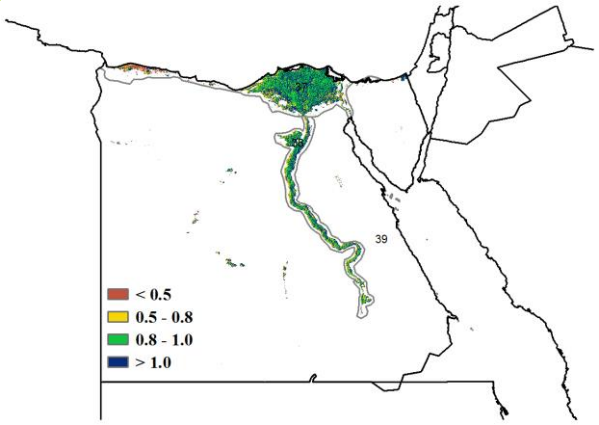
**Figure 3.14. Egypt's crop condition, October 2018 - January 2019**



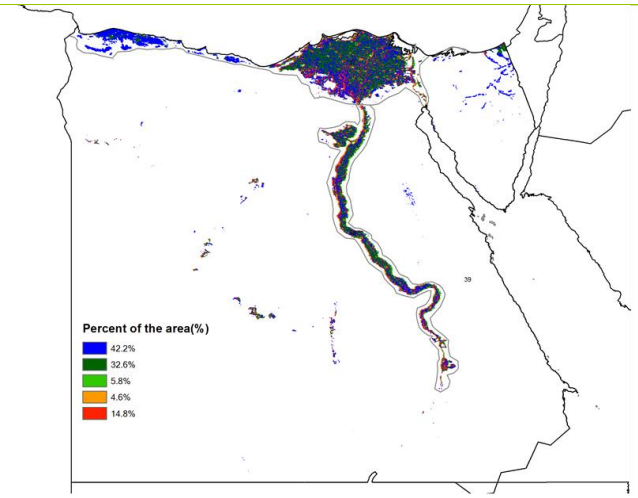

(a). Phenology of major crops



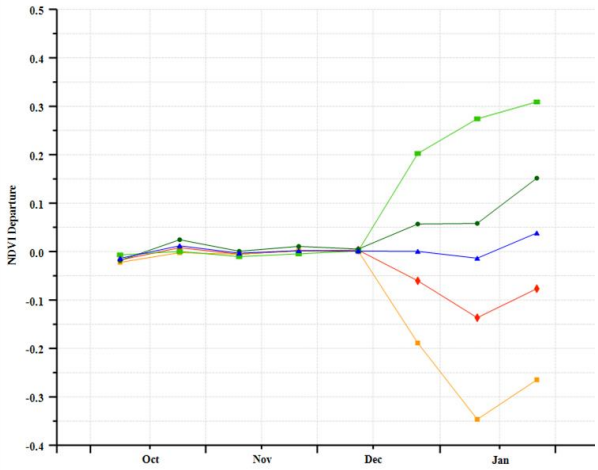

(b) Crop condition development graph based on NDVI



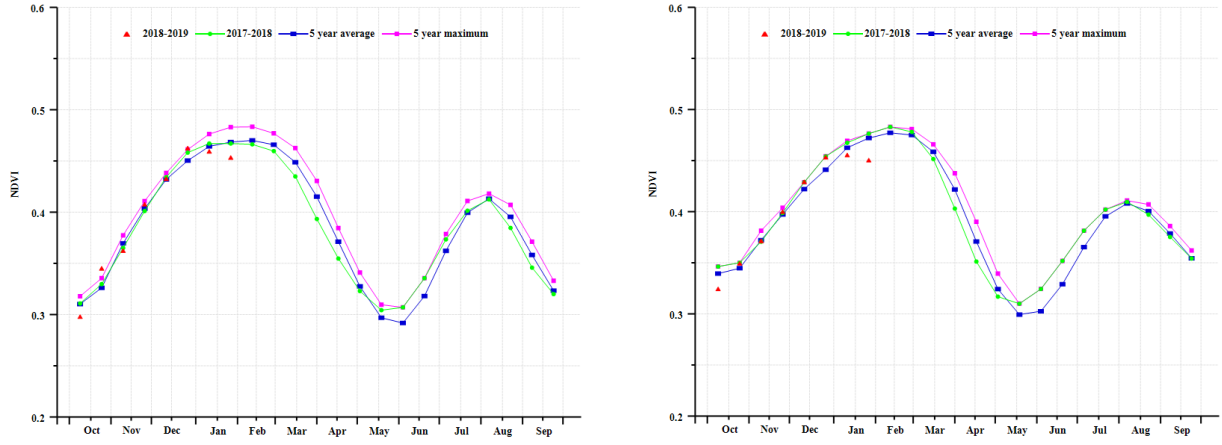

(c) Maximum VCI




(d) Spatial NDVI patterns compared to 5YA




(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Nile Delta (left) and Nile Valley (right))

**Table 3.19. Egypt's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| **Region** | **Current (mm)** | **Departure from 15YA (%)** | **Current (°C)** | **Departure from 15YA (°C)** | **Current (MJ/m2)** | **Departure from 15YA (%)** |
| **Nile Delta and Mediterranean coastal strip** | 36 | -4 | 17.9 | -0.6 | 757 | 0 |

| | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| Region | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Nile Valley | 98 | 48 | 17.8 | -0.4 | 886 | 0 |

**Table 3.20. Egypt's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| Region | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Nile Delta and Mediterranean coastal strip | 192 | 7 | 71 | 7 | 1.0 |
| Nile Valley | 215 | 63 | 82 | 14 | 1.2 |

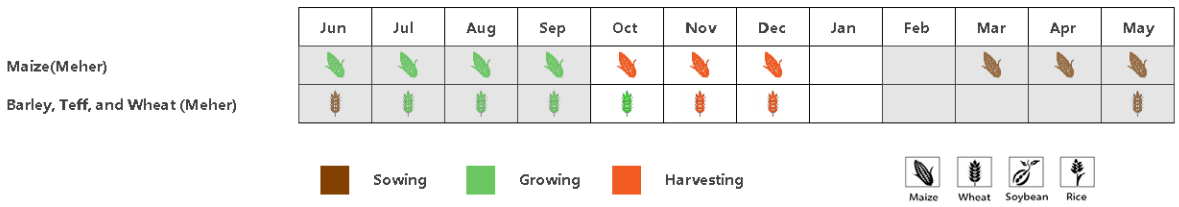
# [ETH] Ethiopia

The monitoring period covers mainly the harvest of maize, some wheat, teff as well as other Meher season crops. Although there was a slight drop in rainfall compared to average (5%) and sunshine (as measured by RADPAR) was up 2%, nationwide agro-climatic conditions are best described as average. This resulted in close to average biomass production potential (BIOMASS +3%). The maximum VCI was highest (0.83) in the central and northern parts of the country, including Amhara, central Tigray, Oromia, and northeast SNPP. According to the spatial NDVI clusters and profiles, 64.4% of the cropped area experienced favorable conditions compared to the average.
In general, the indicators show favorable crop output for the Meher season.

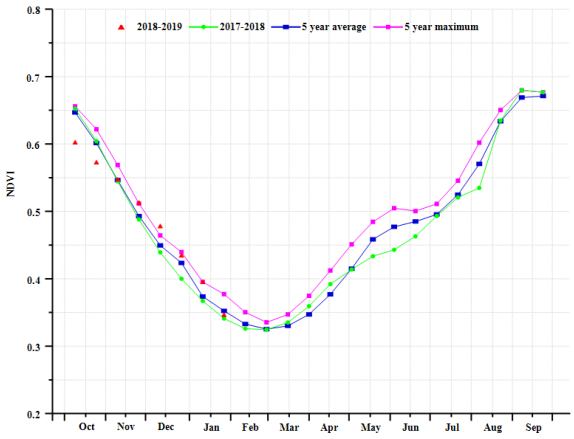
**Regional Analysis**

For the current monitoring period, the analysis covers three agro-ecological zones, namely the Southeastern mixed-maize zone, Western mixed maize zone, and Central-northern maize-teff highlands zone. The zones extend over Oromia and Dire Dawa, Harari, Amhara, and Tigray where farmers grow mainly rain-fed cereals.
Precipitation recorded over the **Southeastern mixed-maize zone** reached 120 mm, which is 27% below average. Both TEMP and RADPAR were just above average (0.9 °C and 1%, respectively). The BIOMSS fell 18% compared with average, the largest value in the country. The CALF decreased below average and the crop condition development graph based on NDVI was mostly below the five-year average. With the maximum VCI values at 0.75, crop prospects are unfavorable.
In comparison with the previous zone, the **Western mixed maize zone** recorded better rainfall (RAIN 177 mm), 7 % above average. The temperature was slightly below average (TEMP -0.3°C) and the BIOMSS potential is up 11%, which is particularly welcome for range lands and livestock production. The RADPAR increased by 3% while CALF remained constant at 100%, indicating fully cropped arable land. According to the NDVI development graph crop condition was above average. The maximum VCI value was 0.93. All CropWatch Indicators concur in assessing crop and livestock feed condition as favorable.
In the **Central-northern maize-teff highlands zone**, both the agronomic and agro-climatic indicators were above average. Total rainfall (RAIN at 106 mm) was 11% above average, TEMP increased 0.1°C above average and so did RADPAR (1%), BIOMASS (19%) and CALF (1%). Like the western mixed maize zone, this area was favorable for livestock production. VCIx reached 0.8 in this zone which includes Central Amhara, the main teff and wheat producing area in the country. Crop condition exceeded the average of the previous five years based on NDVI profile. Overall, environmental and crop condition were favorable in this zone, and a good harvest is expected.

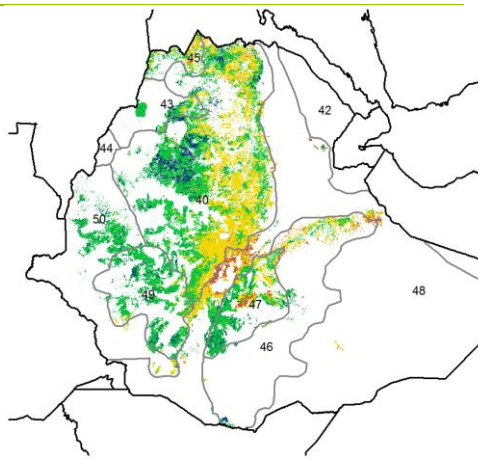
**Figure 3.15. Ethiopia's crop condition, October 2018 - January 2019**



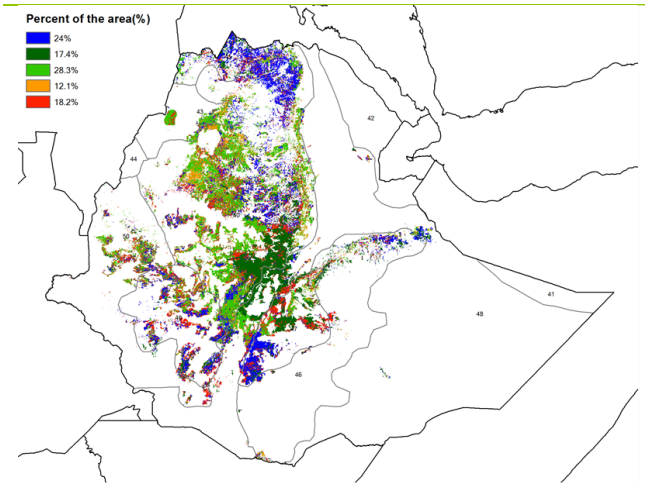

(a). Phenology of major crops



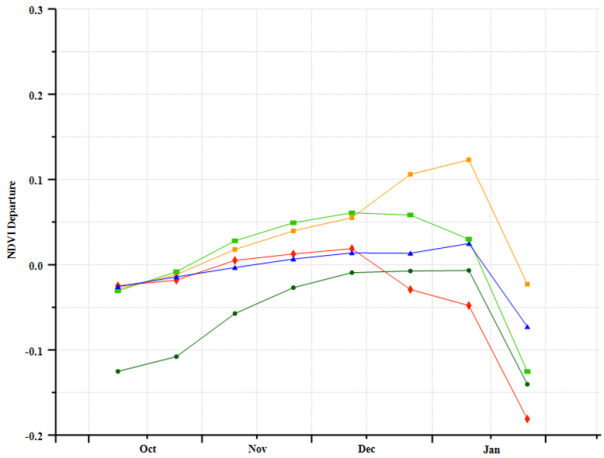

(b) Crop condition development graph based on NDVI



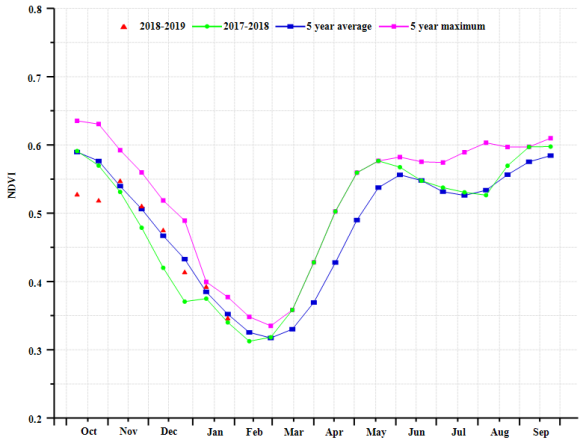

(c) Maximum VCI

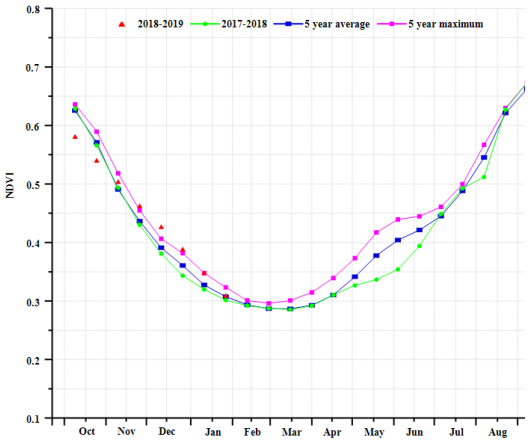



(d) Spatial NDVI patterns compared to 5YA

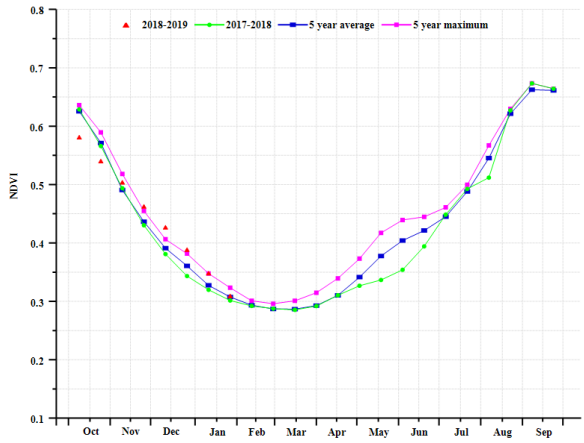



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (south-eastern mixed-maize (left) and western mixed maize zone (right))




(g) Crop condition development graph based on NDVI (Central-northern maize-teff highlands zone)

**Table 3.21. Ethiopia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| South-eastern mixed maize zone | 120 | -27 | 21.0 | 0.0 | 1266 | 1 |
| Western mixed maize zone | 177 | 7 | 23.2 | -0.3 | 1276 | 3 |
| Central-northern maize-teff highlands | 106 | 11 | 18.8 | 0.1 | 1382 | 1 |
| South-eastern mixed maize zone | 120 | -27 | 21.0 | 0.0 | 1266 | 1 |

**Table 3.22. Ethiopia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/$m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| South-eastern mixed maize zone | 461 | -18 | 90 | -3 | 0.75 |
| Western mixed maize zone | 702 | 11 | 100 | 0 | 0.93 |
| Central-northern maize-Teff highlands | 438 | 19 | 91 | 1 | 0.82 |
| South-eastern mixed maize zone | 461 | -18 | 90 | -3 | 0.75 |

# [FRA] France

The monitoring period covers winter wheat sowing and early growth as well as the harvest of spring wheat and maize.

Weather conditions were normal at the national level. This includes a 1% increase in RAIN above average, slightly below average temperature, and an increase in sunshine (RADPAR +3%) and BIOMSS(+4%).

The NDVI development graph for the entire country indicates crop condition below the average of the past five years and 2017-2018. The spatial NDVI patterns show that crop condition was about average in 69.1% of arable land. A drop in NDVI January occured mostly in highlands or areas of marginal agricultural importance and is probably due to snow. This spatial pattern is also roughly reflected by the maximum VCI (VCIx) in the different areas with a surprising discrepancy over the Massif Central where NDVI is very low in January and VCIx exceeds 0.8. Countrywide, however average VCIx was 0.82.

**Regional analysis**

Considering cropping systems, climatic zones, and topographic conditions, additional sub-national detail is provided for eight agro-ecological zones. They are identified in the maps by the following numbers: (54) Northern barley region, (58) Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean, (55) Maize-barley and livestock zone along the English Channel, (56) Rapeseed zone of eastern France, (51) Dry Massif Central zone, (57) Southwestern maize zone, (52) Eastern Alpes region, and (53) the Mediterranean zone.

In the **Northern barley region** both RAIN and TEMP were below average (9% and 1.4°C, respectively), while RADPAR was 10% above. Low VCIx values (0.77) reflect overall unsatisfactory crop condition.

The **Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean** experienced average temperature, RAIN was 7% below average, and TEMP very significantly so by -2.1°C. According to the NDVI profile and VCIx map, crop condition was unsatisfactory in the region.

The **Maize/barley and livestock zone along the English Channel** recorded 241 mm of rainfall over four months (RAIN -7%). Temperature was down 1.6°C but RADPAR was 9% above average. The drop in BIOMSS was 2% compared to the five-year average. The NDVI profile confirms the conditions of crop between poor and average.

The **Rapeseed zone of eastern France** recorded an 8% rainfall deficit, with above average values for RADPAR (8%). BIOMSS for the region is 1% below the five-year average, and a low VCIx value reflects the generally unsatisfactory crop and especially pastures condition, as confirmed by the NDVI development graph.

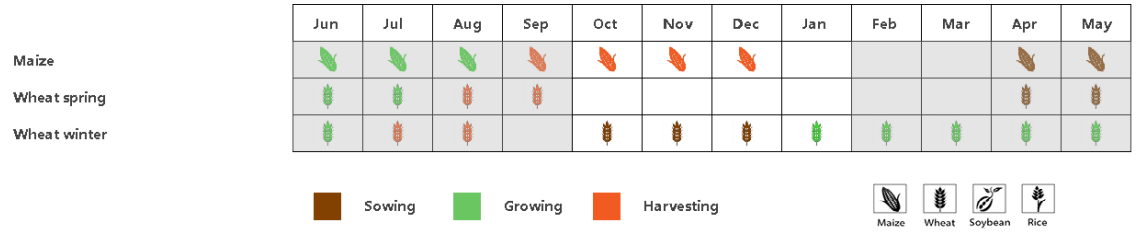
Mostly unfavorable climatic conditions dominated the Dry **Massif Central** zone over the reporting period. Rainfall was 21% below average (212 mm over four months).Temperature was 1.6°C below average. The dry conditions have resulted in a BIOMSS indicator 7% below average for the period.

The **Southwestern maize zone** is one of the major irrigated maize regions in France. Temperature dropped below average by a significant 2.4°C, RADPAR was average, but rainfall was above expectations by +13%. Crop condition was average according to the NDVI development graph, as confirmed by the VCIx map, which shows that crop condition was satisfactory.

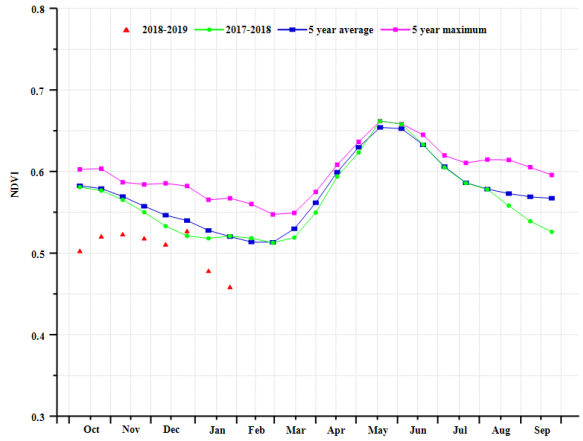
Environmental conditions for the **Eastern Alpes** region were mostly abnormal with the following values: RAIN +7%, TEMP -1.2°C; RADPAR was about average (+2%). Almost all arable land in this region was cropped during the monitoring period, and the average VCIx is 0.87.The NDVI profile confirms the crop condition.

Finally, the most favorable weather conditions were observed in the **Mediterranean zone** (RAIN +33%) even if other indicators remain close to average, except for TEMP (-0.7°C). According to the NDVI profiles, crop condition remained favorable since October. BIOMSS is 28% above its five-year average, and the VCIx value of 1.05 for the region is the highest in the country.

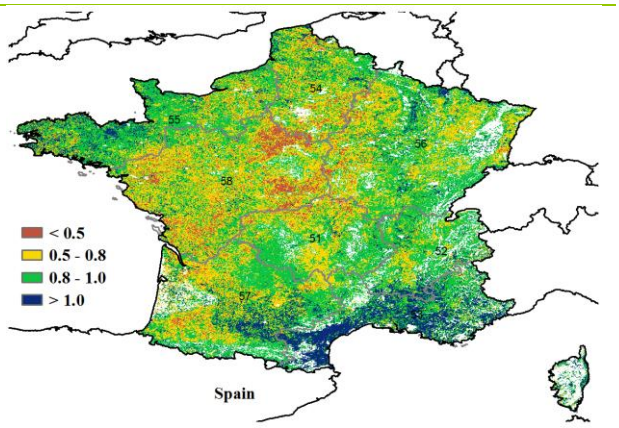
**Figure 3.16. France's crop condition, October 2018 - January 2019**



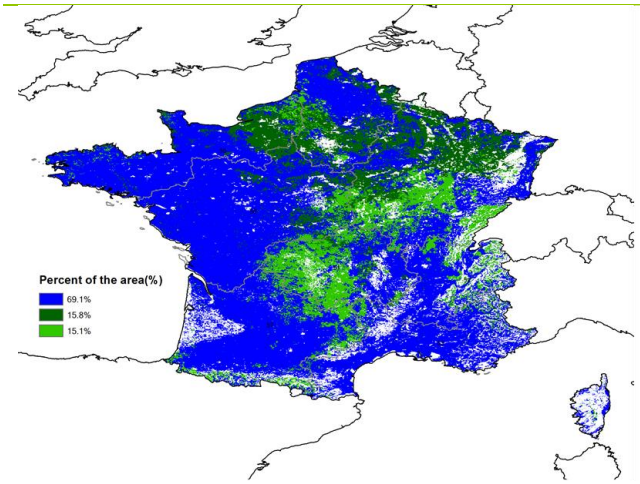

(a). Phenology of major crops



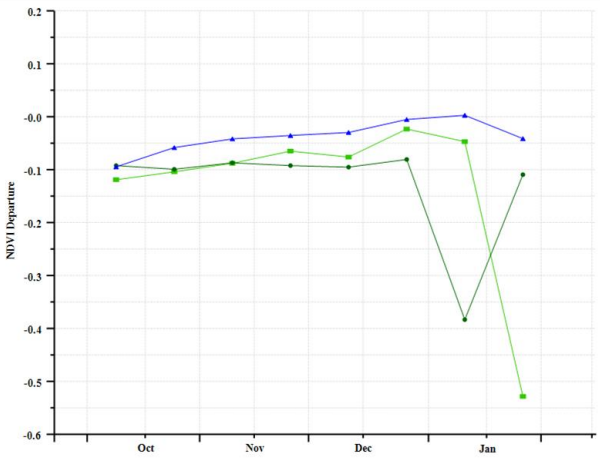

(b) Crop condition development graph based on NDVI



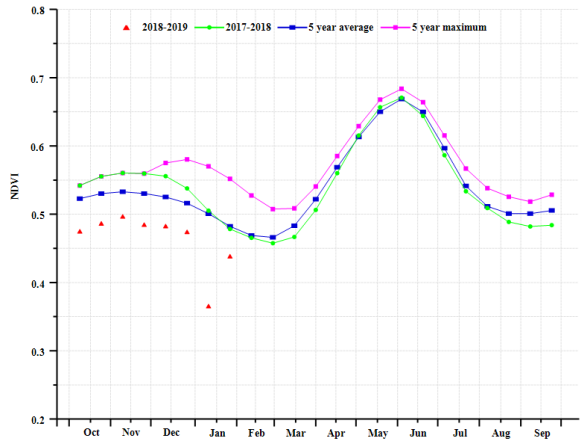

(c) Maximum VCI

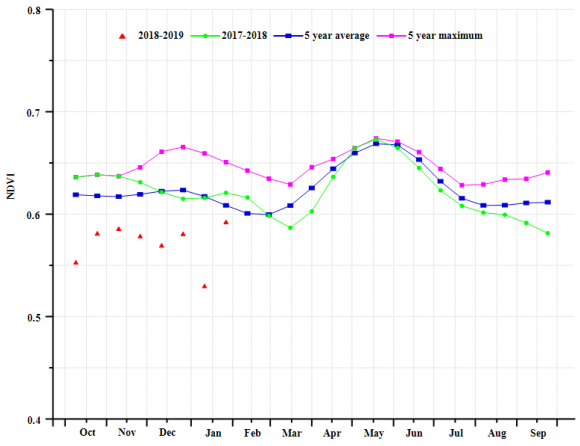



(d) Spatial NDVI patterns compared to 5YA

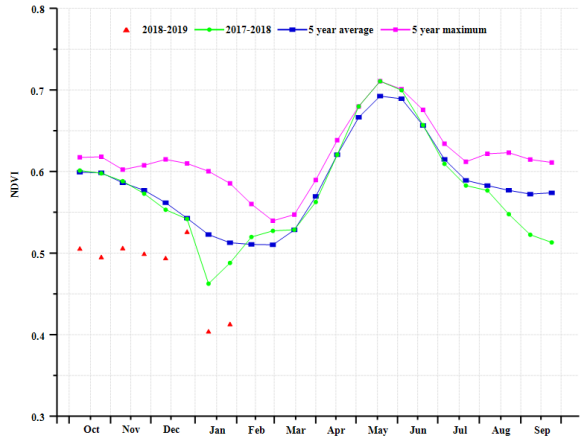


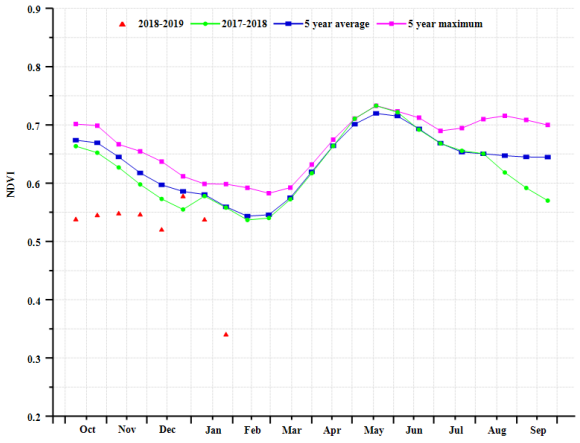

(e) NDVI profiles



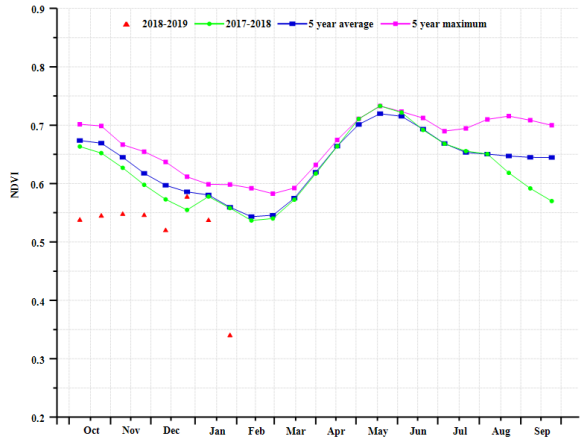



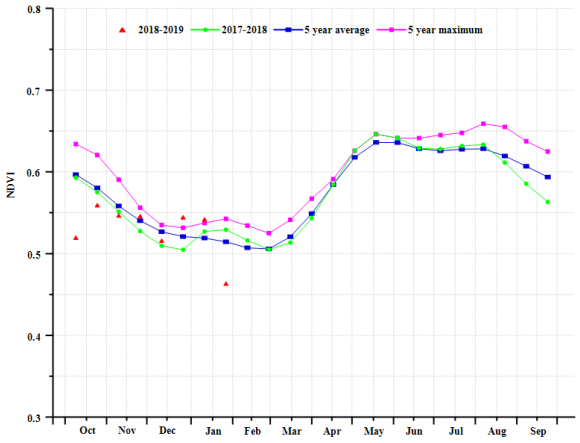

(f) Crop condition development graph based on NDVI (Northern barley region (left) and Mixed maize, Barley and Rapeseed zone (right))



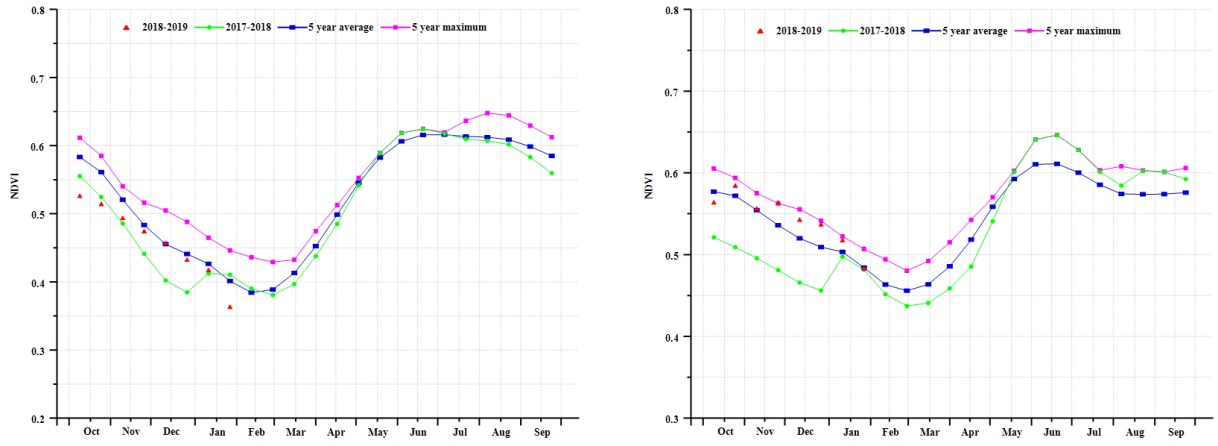




(g) Crop condition development graph based on NDVI (Maize, barley and livestock zone (left) and Rapeseed zone (right))




(h) Crop condition development graph based on NDVI (Dry Massif Central zone (left) and Southwest maize zone (right))




(i) Crop condition development graph based on NDVI (Eastern Alpes region (left) and Mediterranean zone (right))

**Table 3.23. France's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Northern Barley zone | 266 | -9 | 7.5 | -1.4 | 268 | 10 |
| Mixed maize/barley and rapessed zone from the Centre to the Atlantic Ocean | 164 | -7 | 8.5 | -2.1 | 324 | 4 |
| Maize barley and livestock zone along the English Channel | 241 | -7 | 8.7 | -1.6 | 283 | 9 |
| Rapeseed zone of eastern France | 241 | -8 | 6.3 | -1.0 | 307 | 8 |
| Dry Massif Central zone | 212 | -21 | 6.4 | -1.6 | 354 | 2 |
| Southwest maize zone | 296 | 13 | 8.4 | -2.4 | 395 | -1 |
| Eastern Alpes region | 454 | 7 | 4.2 | -1.2 | 400 | 2 |
| Mediterranean zone | 403 | 33 | 7.3 | -0.7 | 445 | -3 |

**Table 3.24. France's agronomic indicators by sub-national regions, current season's value and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Northern Barley zone | 1063 | 1 | 96 | -3 | 0.77 |
| Mixed maize /barley and rapessed zone from the Centre to the Atlantic Ocean | 738 | 0 | 93 | -4 | 0.69 |
| Maize barley and livestock zone along the English Channel | 1006 | -2 | 100 | 0 | 0.86 |
| Rapeseed zone of eastern France | 936 | -1 | 97 | -3 | 0.82 |
| Dry Massif Central zone | 844 | -7 | 99 | -1 | 0.78 |
| Southwest maize zone | 998 | 11 | 99 | 3 | 0.82 |
| Eastern Alpes region | 891 | 8 | 95 | 1 | 0.87 |
| Mediterranean zone | 1056 | 28 | 96 | 7 | 1.05 |

# [GBR] United Kingdom

Summer crops have been harvested and winter crops (winter wheat, winter barley, and rapeseed) have been planted during the current reporting period. According to crop condition graph, NDVI values were below average from October to end of December. Agroclimatic indicators show that rainfall and temperature for the country were below average (RAIN, -13.2%, TEMP, -1.4°C) and radiation and biomass were slightly above average (RADPAR, +2.8%, BIOMSS, +0.8%). The NDVI departure cluster profiles indicate below average values in 47.7% of arable land including East Midlands (Lincolinshire), East Angelia (Northampton,Bedford, Cambridge, Huntingdon and northern of Norfolk), Southwest (Conrwall),West (Oxford, Wilt), and South (Berk) and slightly above average values in 46.4% Yorkshire and South west ( Somerset, Dorset) from November to January. The national average VCIx was good 0.91, and the cropped arable land fraction slightly decreased by 0.4% compared to its five-year average.

**Regional analysis**

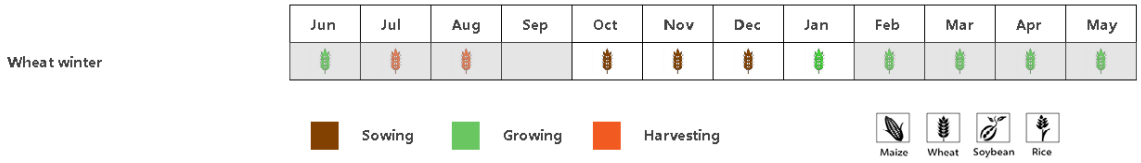
Based on cropping systems, climatic zones, and topographic conditions,three sub-national regions Central sparse crop region, Northern barley region, and Southern mixed wheat and barley region can be distinguished. Central sparse and Southern sub-regions characterized by unchanged fractions of arable land (CALF), and increased by 1% in the Northern Barley region compared to 5 years average.

The central sparse crop region is one of the country's major agricultural regions in terms of crop production. Agroclimatic conditions include rainfall was below average (RAIN -11%),temperature and radiation were slightly below to average (TEMP,-1.3°C,RADPAR, -0.6%), separately. NDVI values were below the five-year maximum according to the region's crop condition development graph in October to late December, above average in January. The VCIx was good at 0.95.

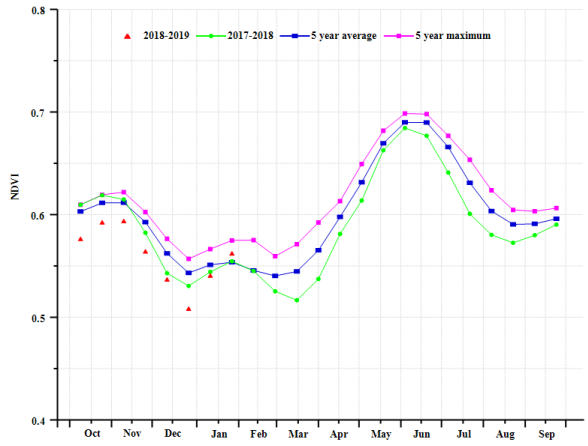
In the main barley region NDVI was above average according to the crop condition graphs in this reporting period. Compared to the fifteen-year average, rainfall (RAIN, -16%) and temperature (TEMP, -1.5°C) were below average, biomass was above average (BIOMSS, +3%), and radiation was unchanged to average. The national VCIx with 0.95.

In the southern mixed wheat and barley zone, NDVI was below average according to the crop condition graph in this period. Rainfall, temperature and biomass (RAIN, -12%, TEMP, -1.3°C, BIOMSS, -1%) was below average, radiation (RADPAR, +5.7%) were above average during this reporting period. The region hadabove average VCIx (0.89), although less so than the other regions.

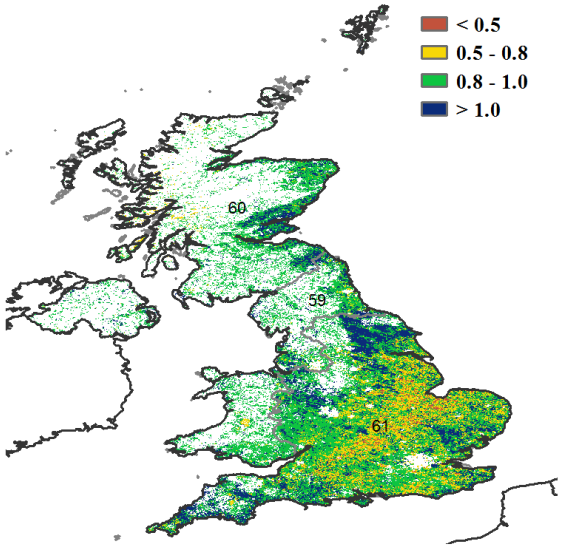
**Figure 3.17. United Kingdom crop condition, October 2018 - January 2019**



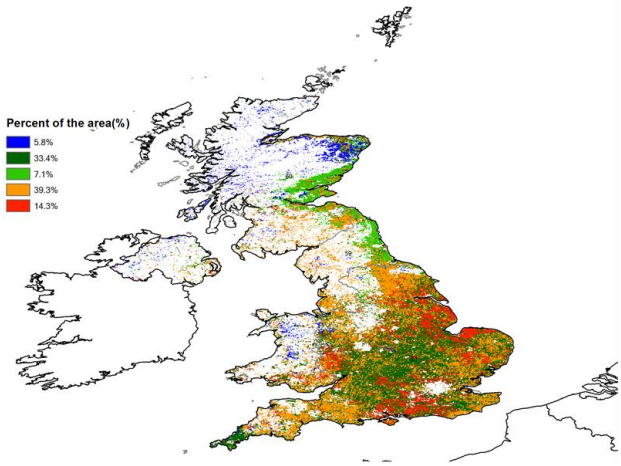

(a). Phenology of major crops



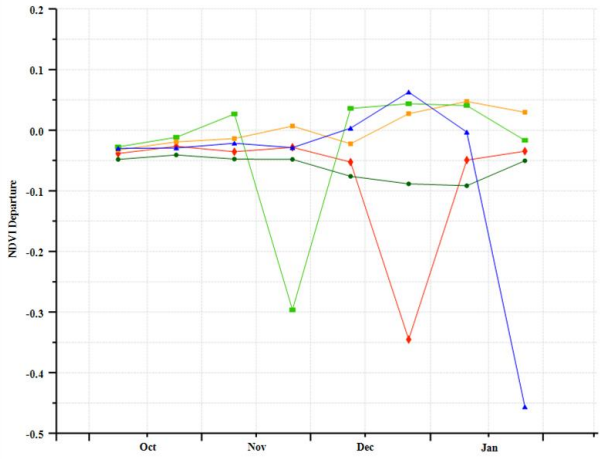

(b) Crop condition development graph based on NDVI



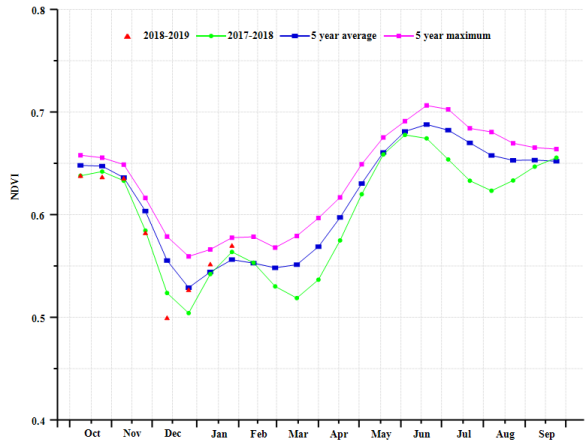

(c) Maximum VCI

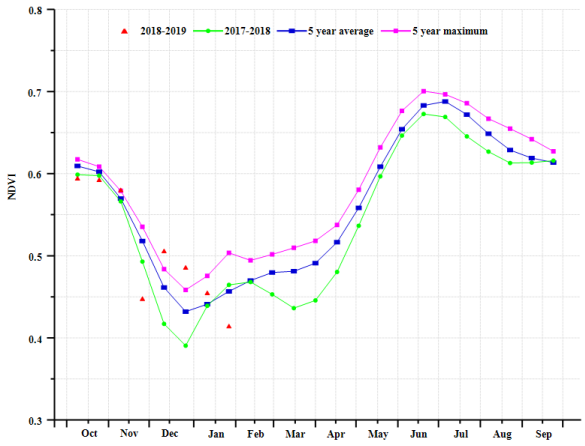



(d) Spatial NDVI patterns compared to 5YA

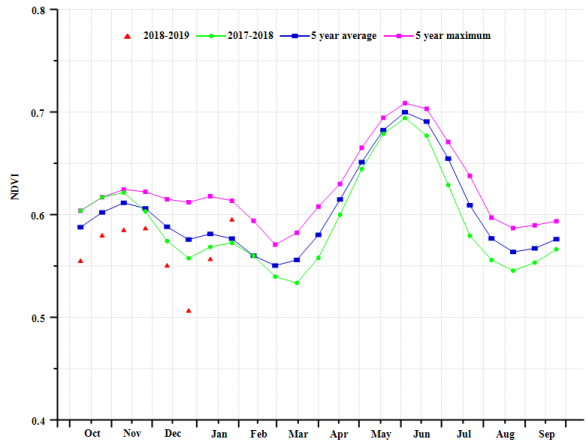



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Sparse crop area of N England, Wales and N. Ireland (left) and Northern Barley region (right))




(g) Crop condition development graph based on NDVI (Southern mixed wheat and Barley region)

**Table 3.25. United Kingdom's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Northern Barley area (UK) | 518 | -16 | 5.6 | -1.5 | 129 | 0.0 |
| Southern mixed wheat and Barley zone (UK) | 319 | -12 | 7.8 | -1.3 | 208 | 5.7 |
| Central sparse crop area (UK) | 466 | -11 | 7.1 | -1.3 | 164 | -0.6 |

**Table 3.26. United Kingdom's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Northern Barley area (UK) | 1033 | 2 | 100 | 1 | 0.95 |
| Southern mixed wheat and Barley zone (UK) | 1150 | -1 | 100 | 0 | 0.89 |
| Central sparse crop area (UK) | 1147 | 3 | 100 | 0 | 0.95 |

# [HUN] Hungary

Winter wheat is the main crop currently in the field in Hungary.

All agro-climatic indicators were above or close to average: RAIN +21.7%, RADPAR +4.3%, and TEMP +0.7°C, which led to a 16% increase in BIOMSS compared with the five-year average. NDVI values, however, were below average according to the national crop condition development graph. About half the croplands had close to average NDVI (Fejer, Bacskiskun, Csongrad, Tolna, Vas and Zala) while less favorable condition prevailed in the Northern Great Plain such as Helves, Jasz-Nagykun-Szolnok, Bekes, and Szabolcs-Szatmar-Bereg. The national average VCIx was fair (0.78), and the cropped arable land fraction decreased by 17% compared to its five-year average.

## Regional analysis

CropWatch has adopted four agro-ecological zones (AEZ) to provide a more detailed spatial analysis for the country. They include North Hungary, Central Hungary, the Puszta and Transdanubia. Specific observations for the reporting period are included for each region.

Cultivated arable land (CALF) decreased in all sub-regions: 14% in North Hungary region, 1% in Southern Transdanubia, and by 7% and 35% in Central Hungary and Puszta sub-regions, respectively.

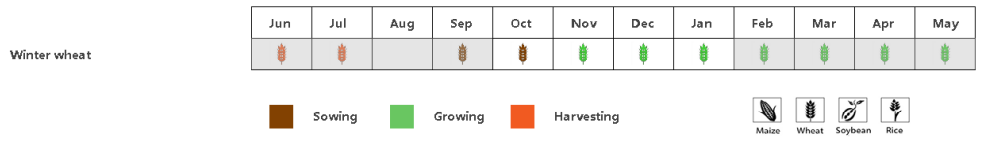
Central Hungary is one of its major agricultural regions in terms of crop production for winter wheat, maize and sunflower are planted in this region. The NDVI was below average. Agro-climatic conditions were above average for rainfall and radiation (RAIN 186 mm or +14%; RADPAR 350 MJ/m2 or +3%), and temperature was close to average (TEMP, +0.6°C). Compared to the 5YA, the biomass production potential was above average (BIOMSS, +12%) while VCIx reached 0.82.

In North Hungary grows 5 to 8% of the national winter wheat, and 1 to 4% of maize. The NDVI was below average from October to January. The accumulated rainfall (RAIN +17%), temperature (TEMP 0.6°C), and radiation (RADPAR +5.3%) were above average, resulting in a biomass production potential increase in this region (BIOMSS +16%).

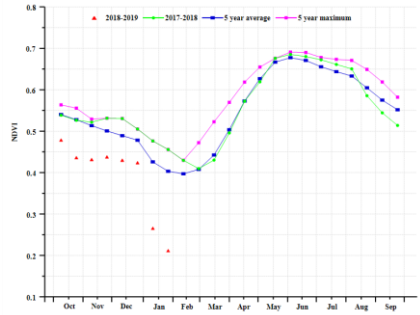
The Puszta region grows mostly winter wheat, maize and sunflower especially in the counties of Jaz-Nagykum-Szolnok and Bekes. According to the crop condition graph, NDVI values were below average. The biomass potential increased by 35% due to high rainfall and radiation (RAIN 53% and RADPAR 2.1%); temperature was close to average (TEMP +0.6°C). The maximum VCIx reached 0.67, indicating a far crop.

Southern Transdanubia cultivates winter wheat, maize and sunflower, mostly in Somogy and Tolna counties while smaller areas are planted in northern Transdanubia. All agro-climatic indicators were about average: RAIN +3%, TEMP 0.9°C and RADPAR +6.1%. The biomass increased by just 2%. The maximum VCI (0.91) stands for good crops in the Transdanubia region.

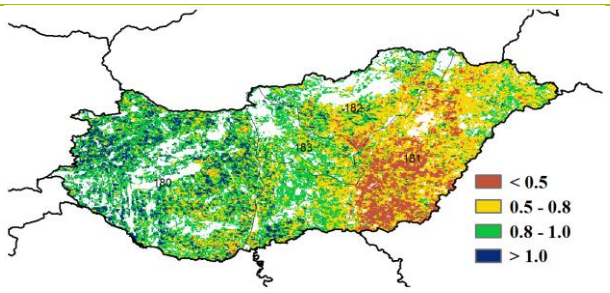
**Figure 3.18. Hungary's crop condition, October 2018 - January 2019.**



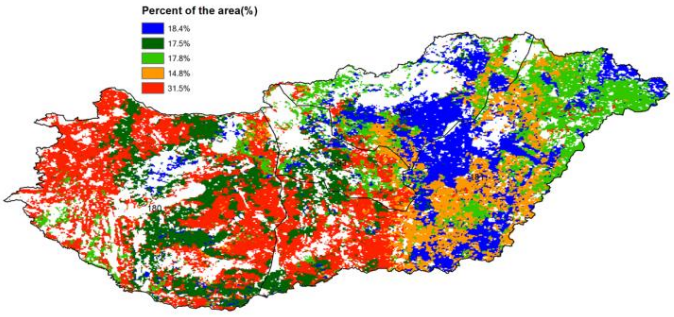

(a). Phenology of major crops



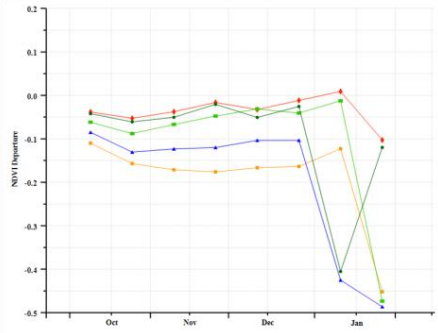

(b) Crop condition development graph based on NDVI



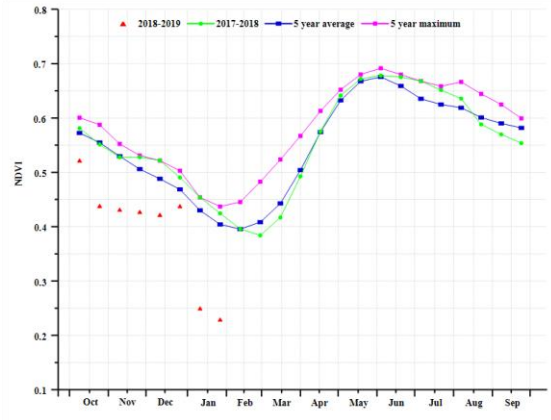

(c) Maximum VCI

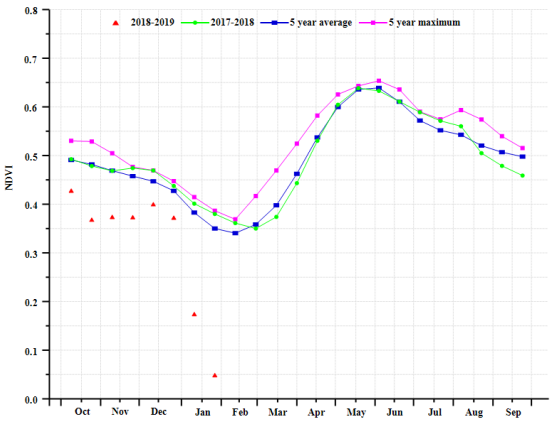



(d) Spatial NDVI patterns compared to 5YA

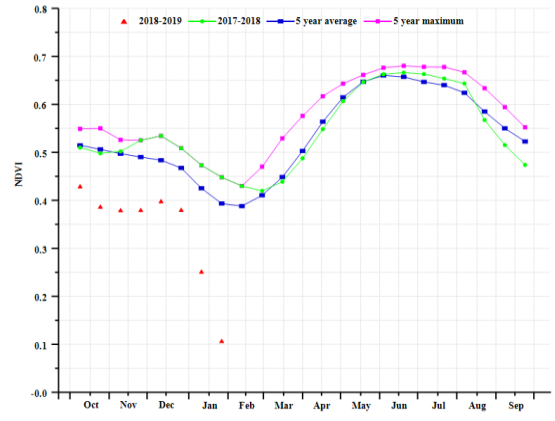


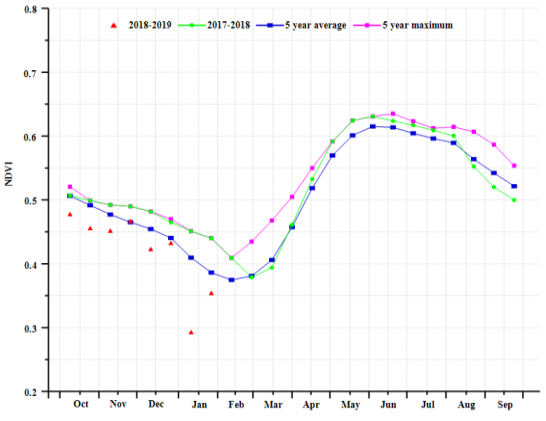

(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Central Hungary (left) and North Hungary (right))




(g) Crop condition development graph based on NDVI (Great Plain (left) and Western Transdanubia (right))

**Table 3.27. Hungary's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | TEMP | RADPAR |
|---|---|---|---|

| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
|---|---|---|---|---|---|---|
| Central Hungary | 186 | 14 | 5.1 | 0.6 | 350 | 3 |
| North Hungary | 186 | 17 | 4.7 | 0.6 | 328 | 5 |
| Great Plain | 239 | 53 | 5.2 | 0.6 | 349 | 2 |
| Transdanubia | 202 | 3 | 5.6 | 0.9 | 373 | 6 |

Table 3.28. Hungary's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Central Hungary | 741 | 12 | 90 | -7 | 0.82 |
| North Hungary | 777 | 16 | 83 | -14 | 0.76 |
| Great Plain | 889 | 35 | 59 | -35 | 0.67 |
| Transdanubia | 770 | 2 | 95 | -1 | 0.91 |

# [IDN] Indonesia

During this monitoring period, the harvest of the secondary maize was completed and the main season maize was sowed in Java and Sumatra; it is now in vegetative stage. Similarly, main season rice has been sowed while the second rice in Java has reached maturity and was harvested.

Rainfall (RAIN, -1%) and temperature (TEMP, -0.4°C) were average, while radiation (RADPAR +4%) was slightly above, which led to an average of biomass production potential. Crop condition was below average as shown in the NDVI development graph. Spatial NDVI profiles show that crop condition was slightly below average before December but better than average in January 2019 in 36.2% of total cropped areas, mostly following a patchy pattern. In 23.3% of the cropped areas (mostly in Jambi, Sumatera Selatan, Kalimantan Timur, Kalimantan Tengah, and Papua), crop condition was persistently below average in this season. Considering that the area of cropped arable land (CALF) in the country increased by 1% compared with the five-year average and the VCIx value of 0.96, the crop condition is nevertheless anticipated to be close to average.

**Regional analysis**

The analysis below focuses on four agro-ecological zones, namely Sumatra (64), Java (62, the main agricultural region in the country), Kalimantan and Sulawesi (63) and West Papua (65), among which former three are relevant for crops cultivation. The numbers correspond to the labels in the VCIx and NDVI profile maps.

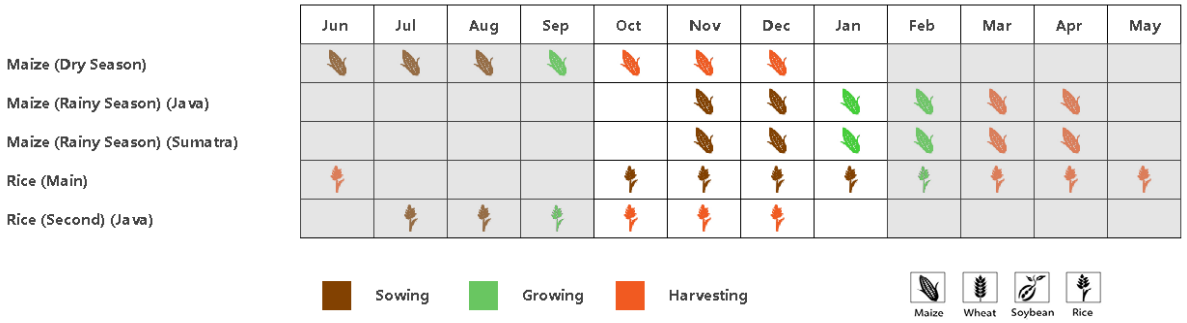
The weather over **Java** was relatively dry compared with average (RAIN, -14%), with above average radiation (RADPAR +7%) and average temperature, resulting in a slight drop (7%) in the biomass production potential. According to the NDVI development graph, crop condition was below the 5-year average. Overall, the crop condition in Java is assessed as fair.

**Kalimantan and Sulawesi** experienced the same patterns as those for the country as a whole: the average temperature (TEMP, -0.3°C) and radiation (RADPAR +3%) and slightly above average rainfall (RAIN, +9%) which led to a marginal increase of biomass production potential by 2% compared to the recent five-year average. According to the NDVI development graph, crop condition was slightly below the 5-year average. Overall, the crop condition was close to average.

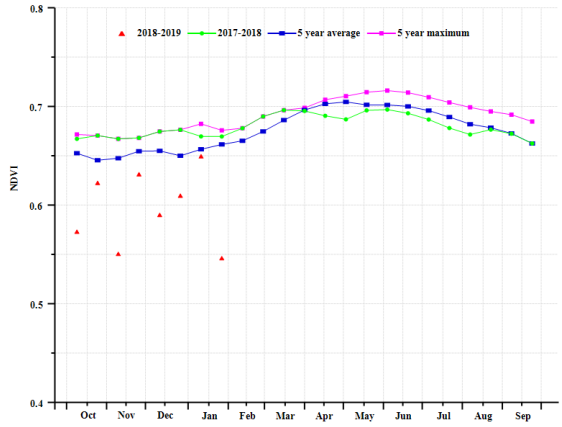
The slightly above average rainfall (RAIN +9%) in **Sumatra** was accompanied by average radiation (+3% departure) and temperature (-0.4°C departure) and resulted in average biomass production potential (BIOMSS +4%). According to NDVI development graphs, crop condition was slightly below the 5-year average. Crop condition in Sumatra was close to average as well.

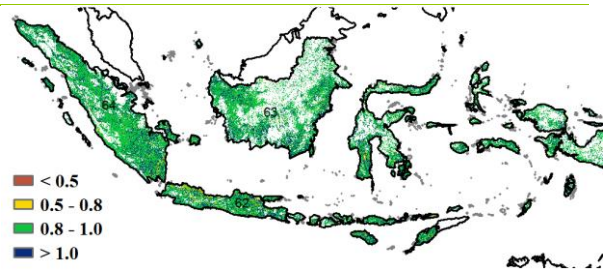
Considering that all the arable land was cultivated and that agro-climatic conditions were fair, CropWatch assesses the condition of crops that were in the field during the reporting period as moderate and satisfactory.

**Figure 3.19. Indonesia's crop condition, October 2018 - January 2019**



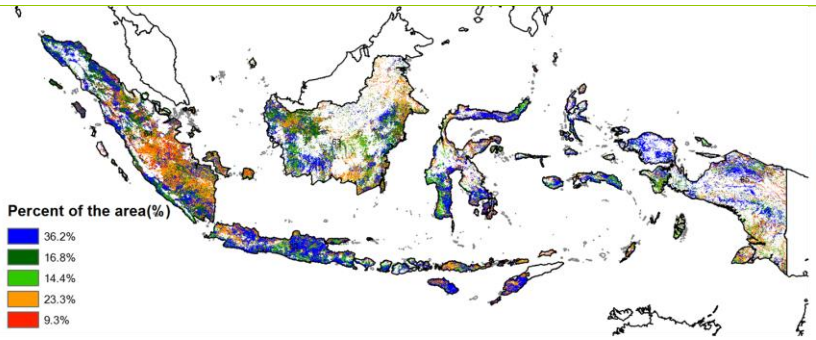
(a). Phenology of major crops

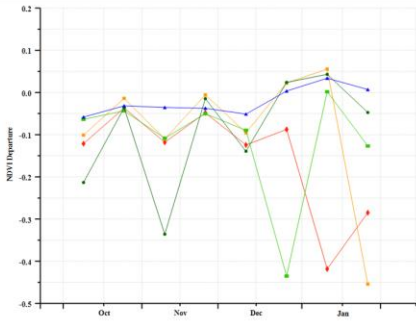



(b) Crop condition development graph based on NDVI

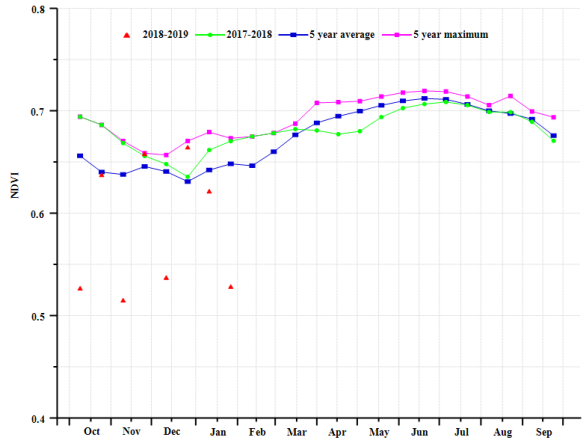
(c) Maximum VCI

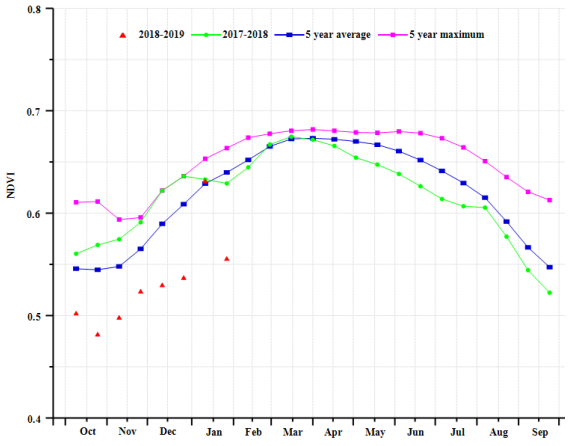


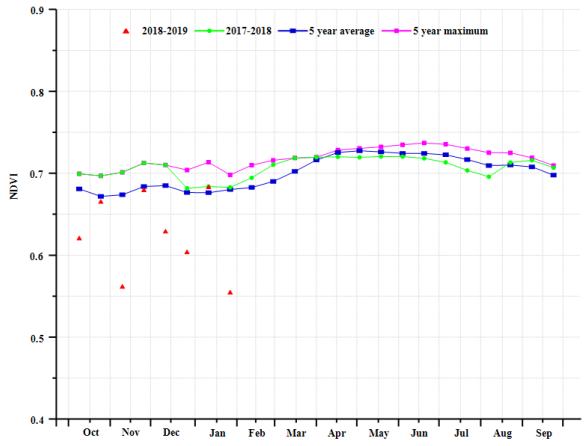

(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Sumatra (left) and Java (right))




(g) Crop condition development graph based on NDVI (Kalimantan-Sulawesi)

**Table 3.29. Indonesia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure (%) | Current (°C) | Departure (%) | Current (MJ/m$^2$) | Departure (%) |
| Java | 887 | -14 | 26.2 | 0.0 | 1290 | 8 |
| Kalimantan and Sulawesi | 1020 | -3 | 26.0 | -0.3 | 1180 | 5 |
| Sumatra | 1270 | 9 | 25.5 | -0.4 | 1070 | 3 |
| West Papua | 1162 | -5 | 25.0 | -0.8 | 1044 | 2 |

**Table 3.30. Indonesia's agronomic indicators by sub-national regions, current season's value and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure (%) | Current (%) | Departure (%) | Current |
| Java | 1758 | -7 | 98 | 2 | |
| Kalimantan and Sulawesi | 2123 | -2 | 100 | 0 | 0.97 |
| Sumatra | 2372 | 4 | 100 | 1 | 0.96 |
| West Papua | 2210 | -2 | 100 | 0 | 0.96 |

# [IND] India

The monitoring period covers the late growth and harvest of Kharif (summer) maize, rice and soybean and the planting and early growth of Rabi (winter) rice and wheat. The crop condition was below average for the country during the period, except for the central northern area where condition improved in December and January.

In general, rainfall was low (RAIN 34% below average) but large differences exist between States. Below average values occurred in Meghalaya (-74%), Nagaland (-68%), Andhra Pradesh (-63%) and Chhattisgarh (-58%). Large positive departures occurred in Punjab (+53%) and Haryana (+23%). Nationwide TEMP remained average. The most significant – but still moderate - TEMP deficits were in Bihar (-0.8°C) and Daman and Diu (-0.7°C). The photosynthetically active radiation (RADPAR) increased slightly by 2% over the recent 5YA but larger departures were recorded in some States such as Manipur (+8%) and Puducherry (+8%).

Crop condition was beneath the previous five-years'average. The least favorable conditions occurred in Chhattisgarh, Gujarat, Rajasthan, Madhya Pradesh and Maharashtra which include areas with poor crop condition identified by VCIx below 0.5.

The biomass accumulation potential (BIOMSS) dropped significantly below average by 24%, nationwide. Overall, as perCropWatch indicators, crop-condition was below average, and reduced BIOMSS output is expected in Nagaland (-50%), Jharkhand (-46%), Madhya Pradesh (-45%), Meghalaya (-43%), and Andhra Pradesh (-42%).The most promising situation (BIOMSS higher than average) occurred inDelhi (36%), Punjab (32%) and Haryana (29%).

**Regional analysis**

India has been divided into seven agro-ecological zones: the Deccan plateau, the Eastern coastal region, the Gangetic plains, the northeastern region, the Western coastal region, the Northwestern dry region and the Western Himalayan region.

The **Deccan Plateau** region recorded 29 mm of RAIN (-61% relative to average), 22.9°C TEMP (+0.4°C) and 1102MJ/m² RADPAR (+2%). BIOMASS decreased 51% in the region which also recorded low NDVI. The CALF recorded 99% which is close to the 5YA,and VCIx was 0.8.

The **Eastern coastal region** recorded below average RAIN (-33%) and TEMP (-0.2°C). The RADPAR of 1115 MJ/m² was3 % higher than the average and BIOMASS was 19% below the 5YA. The region recorded 3% lower than average cropped area and a VCIx of 0.8 indicating moderate crop condition.

In the **Gangetic region**, precipitation amounts to 52 mm (41% lower than 15YA). TEMP was cooler by 0.3°C, and RADPAR was 2 % higher than average. The BIOMASS reached 202 g DM/m2, which is 28 % below the 5YA. The CALF recorded 98%, just above the 5YA(+3%), and VCIx was high at 0.9.

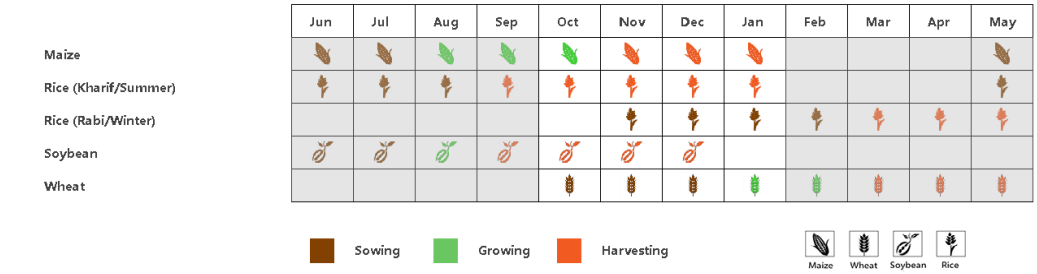
The **Assam and Northeastern region** recorded 110mm rainfall (52% below the average), with slightly higher averageTEMP at 19.6°C (+0.2°C) and RADPAR of 930 MJ/m2 (+3%). The BIOMSS was lower than the average (-29%), and CALF reached 96% which is nearly the 5YA. Crop condition was good with VCIx at 0.9 and good production is expected.

The **Western coastal** region received 18% lower than average rainfall, average TEMP (24.4 °C) and RADPAR of 1177MJ/m² (+3%). This region had 16% lower than average BIOMASS. The CALF was 10% lower than 5YA, but crop condition was satisfactory at 0.8 VCIx.

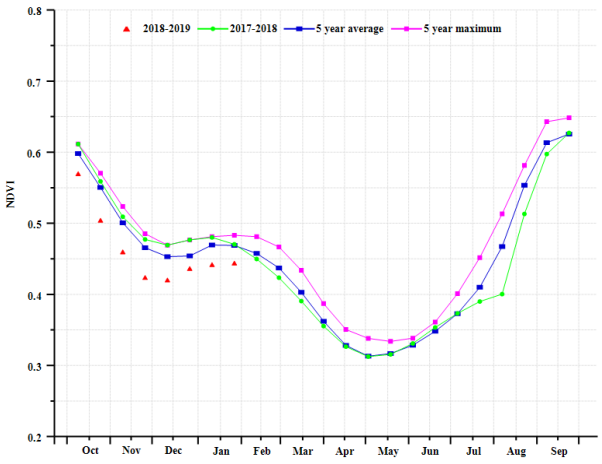
The **Northwestern region** recorded the lowest rainfall value in India (23 mm, lower than average by 28%) and nearaverage TEMP (22.3 °C) and RADPAR (+2%). The BIOMASS was lower than the average (-15%). CALF increased 7% above the 5YA and crop condition was average at 0.8 VCIx.

The **Western Himalayan** region received rainfall of 128 mm (12% above average) and just above average TEMP was recorded (0.3℃). RADPAR reached 871 MJ/m2 (-23 %). The BIOMASS exceeded the 5YA by 16%. The CALF was 3% higher than the average and VCIx at 0.97 indicate good production in general.

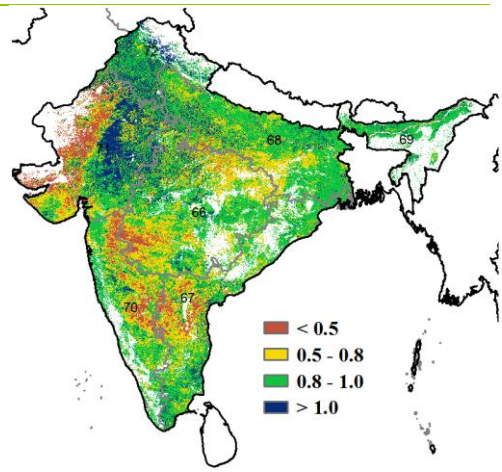
**Figure 3.20. India's crop condition, October 2018 - January 2019**



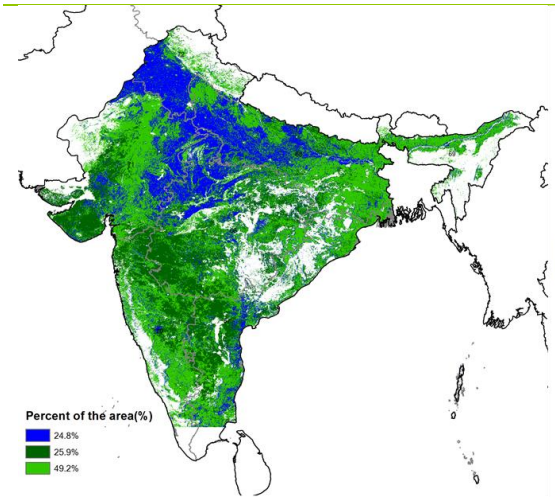

(a). Phenology of major crops



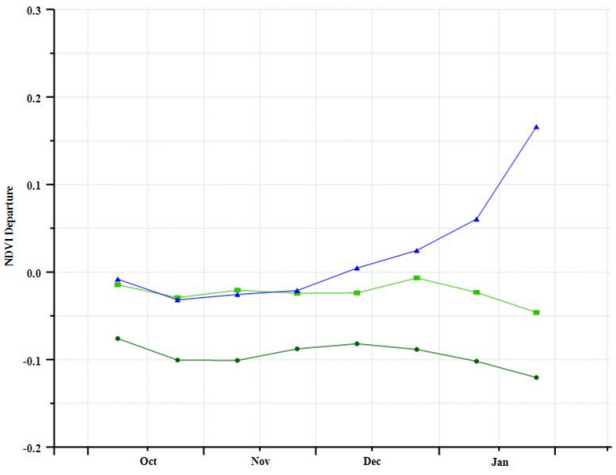

(b) Crop condition development graph based on NDVI



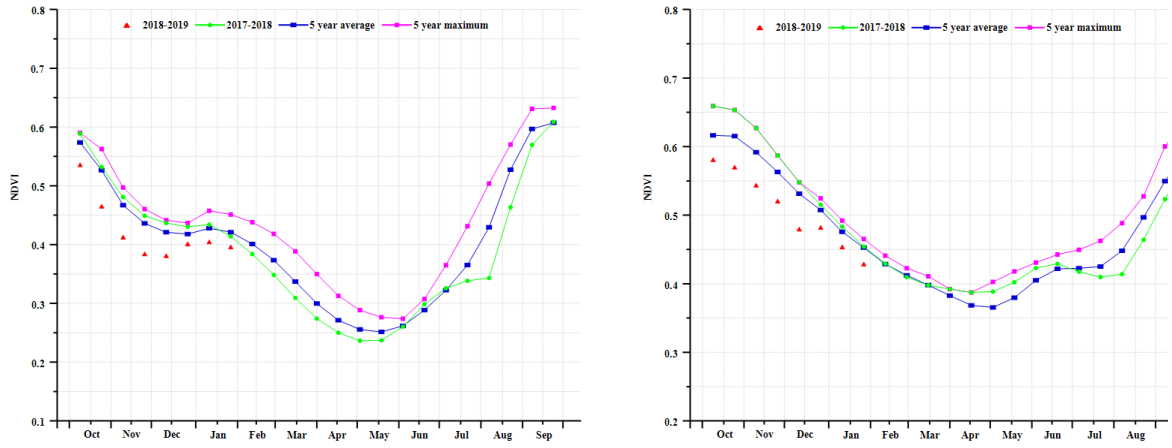

(c) Maximum VCI



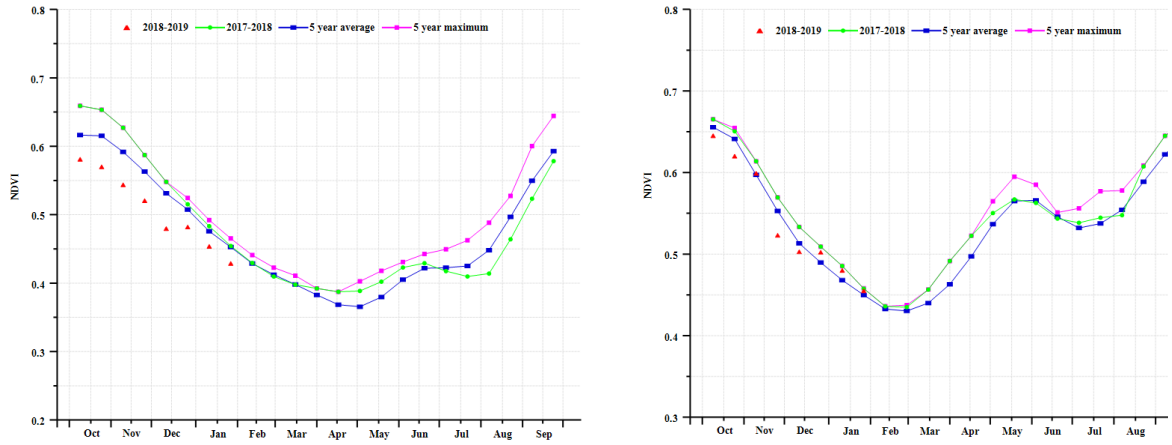

(d) Spatial NDVI patterns compared to 5YA



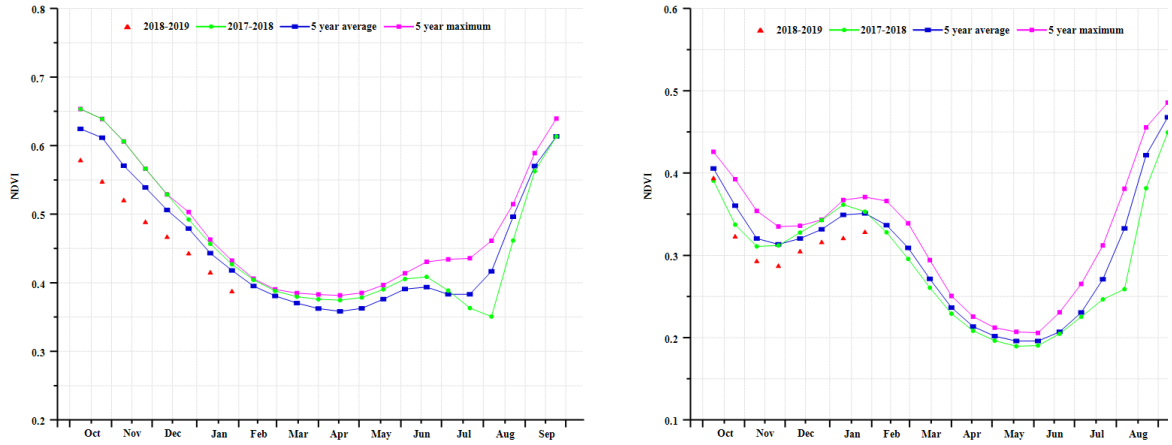

(e) NDVI profiles



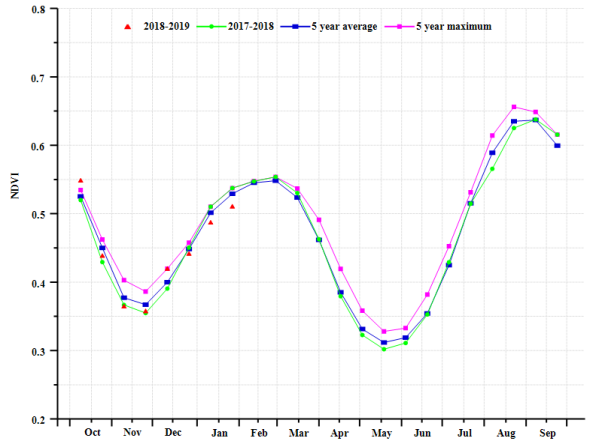

(f) Crop condition development graph based on NDVI (Deccan Plateau (left) and Eastern Coastal Region (right))




(g) Crop condition development graph based on NDVI (Gangatic Plains (left) and North Eastern Region (right))




(h) Crop condition development graph based on NDVI (Western Coastal Region (left) and Western Dry Region (right))




(i) Crop condition development graph based on NDVI (Western Himalayan Region)

**Table 3.31. India's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Deccan Plateau | 29 | -61 | 22.9 | 0.4 | 1102 | 2 |
| Eastern coastal region | 198 | -33 | 24.7 | -0.2 | 1115 | 3 |
| Gangatic plain | 52 | -41 | 20.6 | -0.3 | 996 | 2 |
| Assam and north-eastern regions | 110 | -52 | 19.6 | 0.2 | 930 | 3 |
| Western coastal region | 192 | -18 | 24.4 | 0 | 1177 | 3 |
| North-western dry region or Rajastan and Gujarat | 23 | -28 | 22.3 | -0.1 | 1072 | 2 |
| Western Himalayan region | 128 | 12 | 9.8 | 0.3 | 871 | -3 |

**Table 3.32. India's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Deccan Plateau | 127 | -51 | 98 | 1 | 0.81 |
| Eastern coastal region | 559 | -19 | 92 | -3 | 0.8 |
| Gangatic plain | 202 | -28 | 98 | 3 | 0.86 |
| Assam and north-eastern regions | 412 | -29 | 96 | 1 | 0.93 |
| Western coastal region | 469 | -16 | 85 | -10 | 0.75 |
| North-western dry region or Rajastan and Gujarat | 93 | -15 | 67 | 7 | 0.8 |
| Western Himalayan region | 356 | 16 | 96 | 3 | 0.97 |

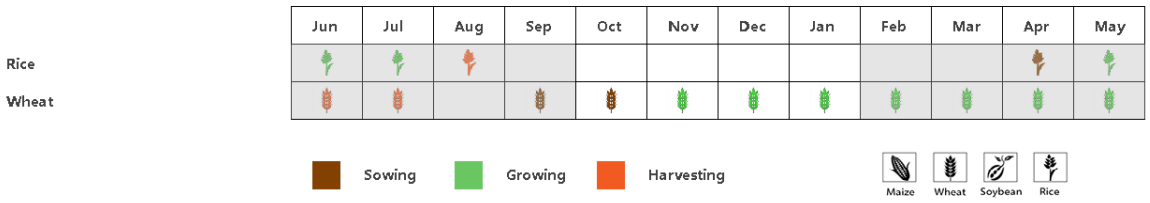
# [IRN] Iran

Crop condition was generally below average from October to early November, and recovered to above average values in January. The planting of winter wheat has been completed in October. Accumulated rainfall and temperature were above average (RAIN +38%, TEMP, +1.0°C), while radiation was below (RADPAR, -7%). The favorable agro-climatic conditions resulted in an increase in the BIOMSS index by 26% compared to the five-year average. The national average of maximum VCI index reached 0.95, and the Cropped Arable Land Fraction (CALF) increased by 51% compared to the recent five-year average. According to the national crop condition development graphs, crop condition was below average across the whole country from October to the early November. It was above average from late November to early January in about 44 .6% of croplands, mainly in Khuzestan, Chaharmahal and Bakhtiari Provinces of the southwest area, Luristan, Hamadan Provinces of the central-west area, and Golestan and Mazandaran Provinces of the central-north area. Remaining croplands experienced unfavorable crop condition from December to January, particularly in the north-western Provinces of Ardabil, East Azerbaijan, Zanjan, Kurdistan, as well as most of the north-east area.
Overall, the early crop condition for winter crops is favorable in the current season. The final outcome of the season will be determined by soil moisture in March when vegetative grows will resume.

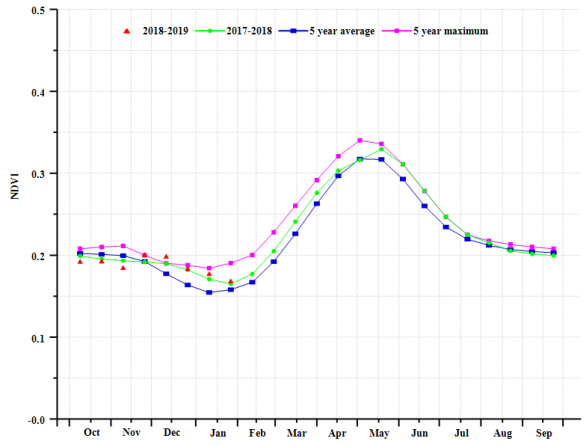
**Regional analysis**

Based on cropping systems, climatic zones, and topographic conditions, three sub-national agro-ecological regions can be distinguished for Iran, among which two are relevant for crop cultivation. The two regions are referred to as the Semi-arid to sub-tropical hills of the west and north (75), and the Arid Red Sea coastal low hills and plains (74).
In the **Semi-arid to sub-tropical hills of the west and north region**, the accumulated rainfall was 345mm (31% above average), temperature was above average (TEMP +1.1°C), while radiation was below average (RADPAR -8%). The favorable weather conditions resulted in an increase of BIOMSS by 20% compared to the recent five years average. The CALF increased by 28%, and the average VCIx (0.99) was high. NDVI profiles showed that NDVI was above average from later November to January 2019, although the NDVI value was within 0.15-0.22.
Crop condition in the **Arid Red Sea coastal low hills and plains** region was above average from November 2018. The region received 364 mm rainfall during this report period. The far above average (RAIN, +113%) rainfall and warm temperature (+0.4°C) resulted in a significant 83% increase of BIOMSS. The CALF increased by 20% compared to five-year average, and the average VCIx (1.13) reached the five-year maximum. Therefore, the crop condition for this season was expected to be favorable.

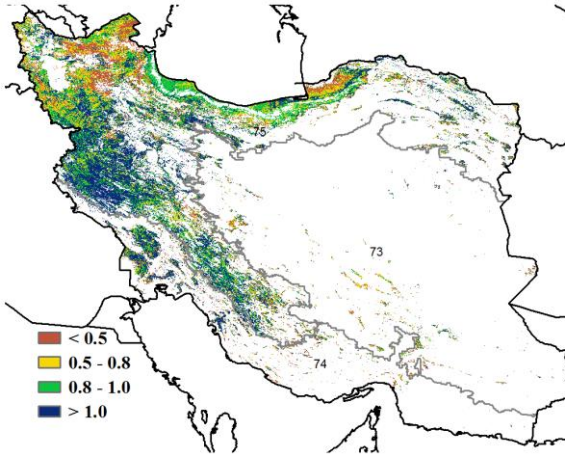
**Figure 3.21. Iran's crop condition, October 2018 - January 2019**



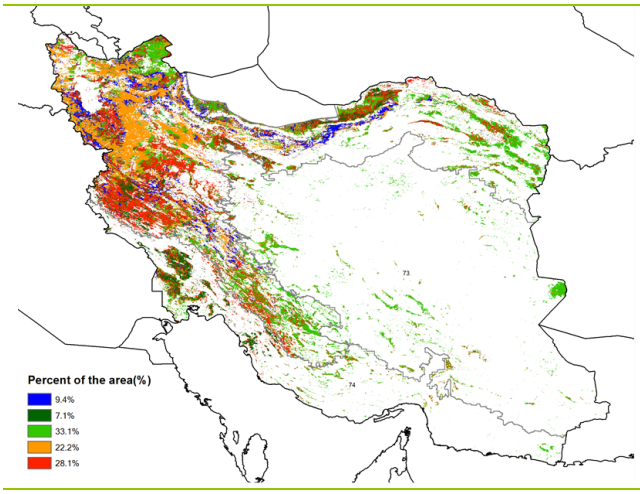

(a) Phenology of major crops



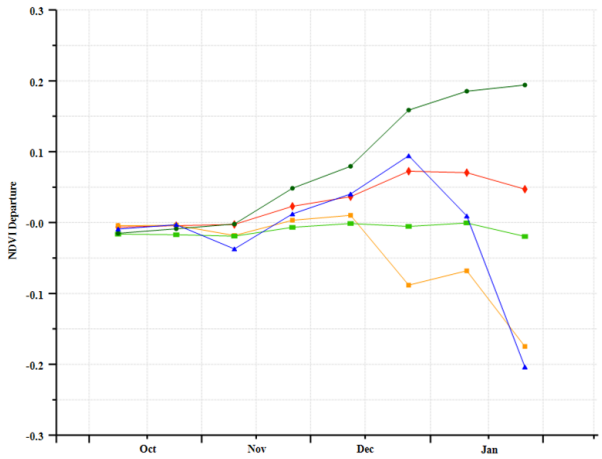

(b) Crop condition development graph based on NDVI



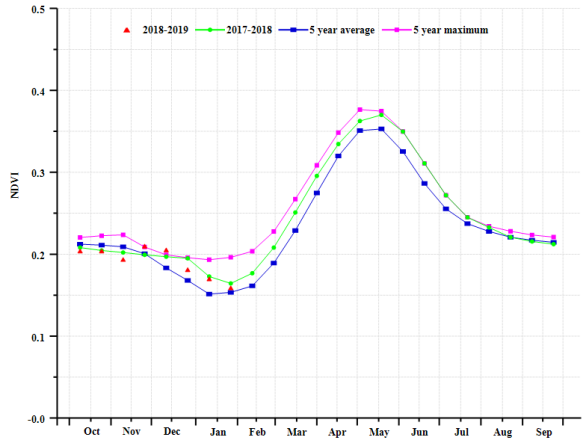

(c) Maximum VCI

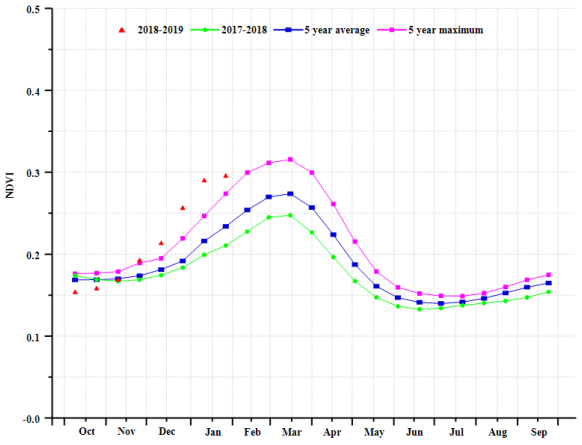



(d) Spatial NDVI patterns compared to 5YA




(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Semi-arid to sub-tropical hills of the west and north region (left) and Arid Red Sea coastal low hills and plains region (right))

**Table 3.33. Iran's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Semi-arid to sub-tropical hills of the west and north | 345 | 31 | 6.7 | 1.1 | 678 | -8 |
| Arid Red Sea coastal low hills and plains | 364 | 113 | 16.9 | 0.4 | 814 | -5 |

**Table 3.34. Iran's agronomic indicators by sub-national regions, current season's value and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Semi-arid to sub-tropical hills of the west and north | 855 | 20 | 10 | 28 | 0.99 |
| Arid Red Sea coastal low hills and plains | 955 | 83 | 27 | 20 | 1.13 |

# [ITA] Italy

Winter wheat was sown from September and is still dormant or growing at the end of this monitoring period. Generally, according to the NDVI development graph, crop condition was below the values of the last year, and above the average of the past five years in October and December. CropWatch agro-climatic indicators show above average Rainfall (+22%), average temperature (+0.2°C) and RADPAR (+1%). With CALF up 5%, BIOMSS increased by 12% and VCIx at 0.89, the overall crop condition in the country is assessed as satisfactory.

**Regional analysis**

Based on cropping systems, climatic zones, and topographic conditions, four sub-national regions can be distinguished for Italy; they include Eastern Italy, Northern Italy, Southern Italy (Sicily) and Western Italy (including Sardinia).

Eastern Italy enjoyed moderately above average rain (RAIN +11%), average TEMP (+0.3°C) and RADPAR (+2%); BIOMSS increased by 9% compared with the averages (5YA). VCIx was 0.87 with a low CALF (0.92). The crop condition development graph indicates that NDVI exceeded the values of last year from November to late December, as well as the 5 years average. After December NDVI dropped below the values of 2017. About average output is expected.

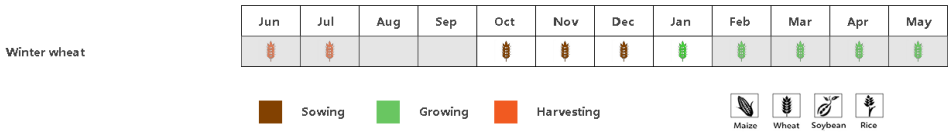
The situation and expected crop production in Northern Italy results from RAIN up 26% compared to average, TEMP up 0.5°C and average RADPAR. BIOMSS exceeds the 5YA by 6%, VCIx reached 0.86 and CALF, 0.88. The crop condition development graph indicates values higher that during last year and reaching the average of 5 years from November to late December. According to the agro-climatic indicators, above average output is expected.

Southern Italy recorded a large excess of precipitation (RAIN +61%), average TEMP (-0.6%) and RADPAR (+1%). BIOMSS increased by 29% compared with the average (5YA). VCIx was the best ever (1.02) and arable land was fully cropped (CALF 0.99). NDVI exceeded the 5 years maximum from October to December. Generally, above average output is expected.

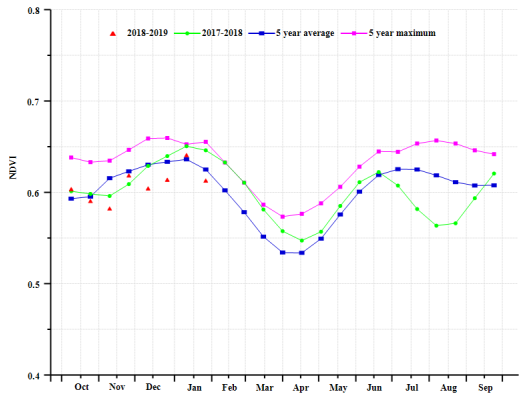
The situation in Western Italy includes precipitation up 22 % above average (RAIN +22%) as well as average RADPAR and TEMP. Compared with the average of the recent five years BIOMSS rose 14%. VCIx reaches 0.88 and CALF is just below 100% (0.98). CropWatch expects above average production.

Overall, prospects of winter crops are generally excellent.

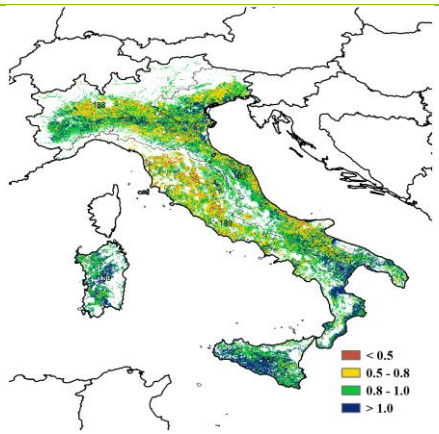
**Figure 3.22. Italy's crop condition, October 2018 - January 2019.**



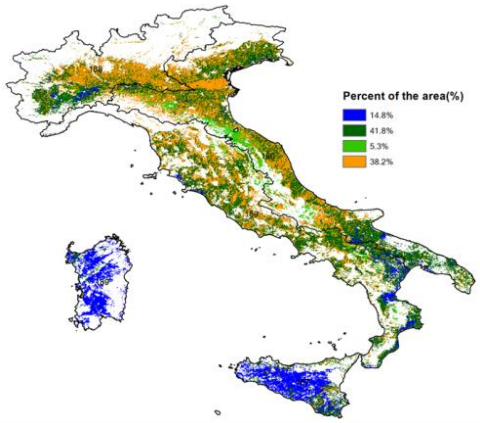

(a). Phenology of major crops



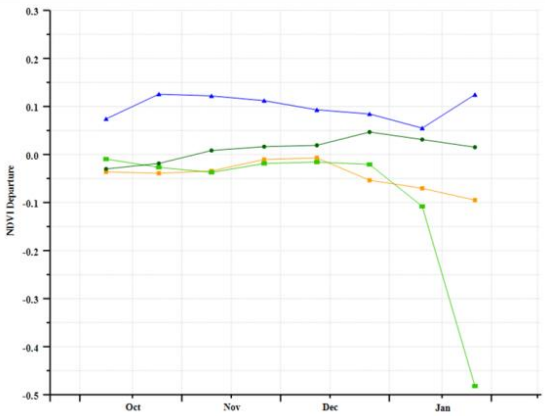

(b) Crop condition development graph based on NDVI



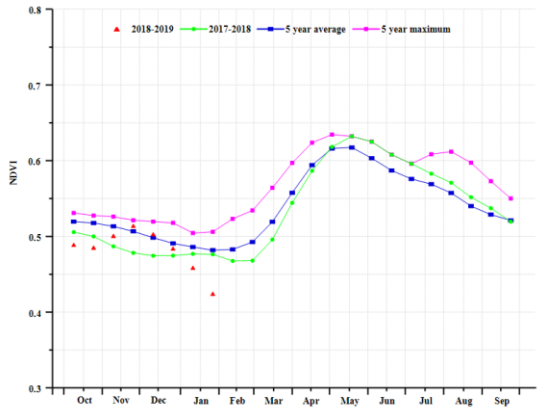

(c) Maximum VCI



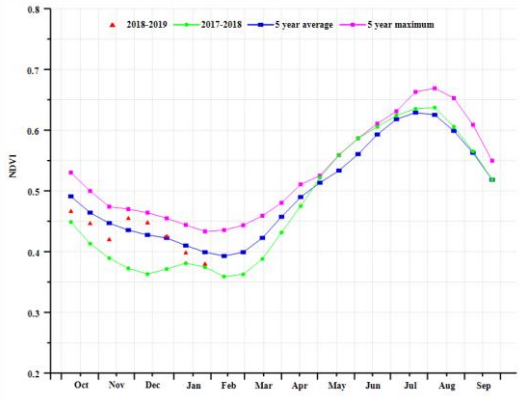

(d) Spatial NDVI patterns compared to 5YA



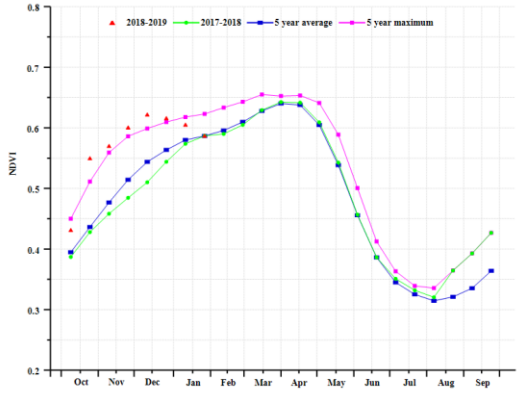

(e) NDVI profiles

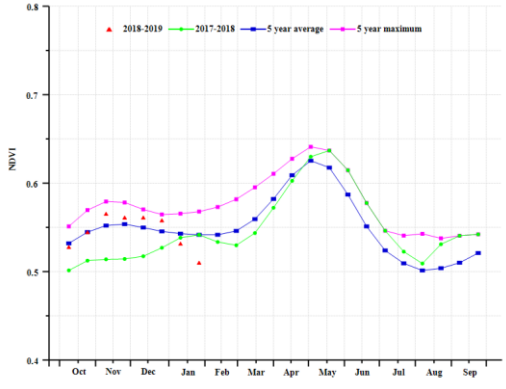



(f) Eastern Italy (Italy) crop condition development graph based on NDVI




(g) Northern Italy (Italy) crop condition development graph based on NDVI



(h) Southern Italy (Italy) crop condition development graph based on NDVI

(i). Western Italy (Italy) crop condition development graph based on NDVI

**Table 3.35. Italy's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Eastern Italy | 283 | 11 | 8.5 | -0.3 | 421 | 2 |
| Northern Italy | 433 | 26 | 5.8 | -0.1 | 415 | 0 |
| Southern Italy | 328 | 61 | 11.9 | -1.1 | 608 | 1 |
| Western Italy | 319 | 22 | 9.3 | -0.5 | 484 | 0 |

**Table 3.36. Italy's agronomic indicators by sub-national regions, current season's value and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Eastern Italy | 926 | 9 | 92 | 7 | 0.87 |
| Northern Italy | 923 | 6 | 88 | 2 | 0.86 |
| Southern Italy | 908 | 29 | 99 | 14 | 1.02 |
| Western Italy | 979 | 14 | 98 | 3 | 0.88 |

# [KAZ] Kazakhstan

Kazakhstan cultivates very few winter crops and almost no wheat was in the field during the current monitoring period. RAIN and RADPAR were above average (+2% and +1%), while TEMP and BIOMSS were below average (-0.4°C and -3%) compared to their respective reference period.

**Regional analysis**

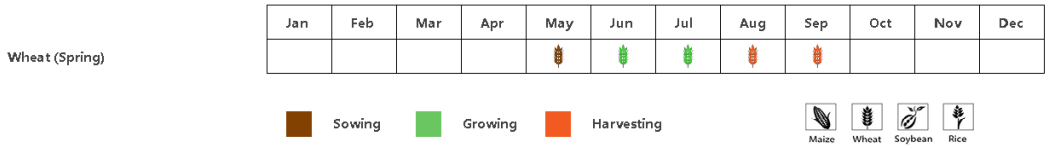
The following regional analysis provides additional detail for three major agro-ecological regions of Kazakhstan: the Northern region, the Eastern plateau and southeastern region and the South region.

In the **Northern region**, NDVI was below the five-year average from November to late December and close to the average in other months. RAIN and TEMP were below average (-1% and -0.5°C), but RADPAR was above (+4%). The agro-climatic indicators also resulted in a decrease of the BIOMSS index by 4%.

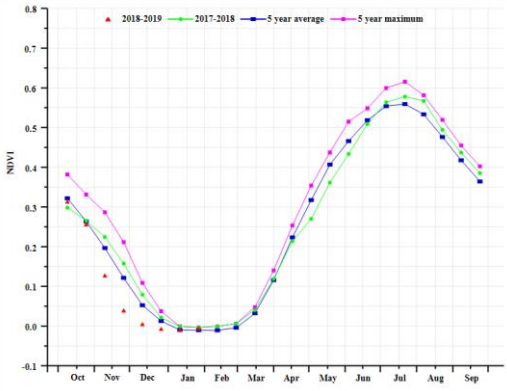
Environmental conditions in the **Eastern plateau and southeastern region** were generally below the five-year average and close to the average only in January. RAIN was above average (3%), and TEMP and RADPAR were below (-0.1°C and -2%, respectively). BIOMSS fell 5%.

The **South region** experienced above average NDVI in early December and late January and below the five-year average in other months. RAIN was 13% above average, but TEMP and RADPAR were below (-0.2°C and -5%). The agro-climatic indicators also resulted in an increase of the BIOMSS index by 13%, which creates favorable conditions for the forthcoming spring crops.

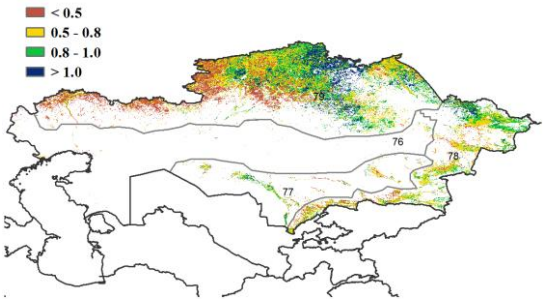
**Figure 3.23. Kazakhstan's crop condition, October 2018 - January 2019**



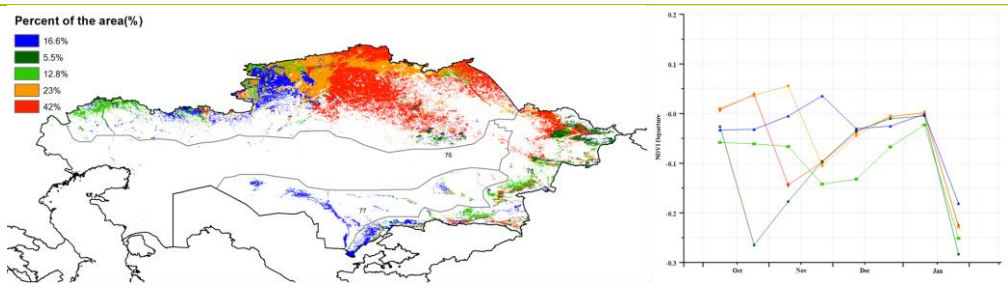

(a). Phenology of major crops



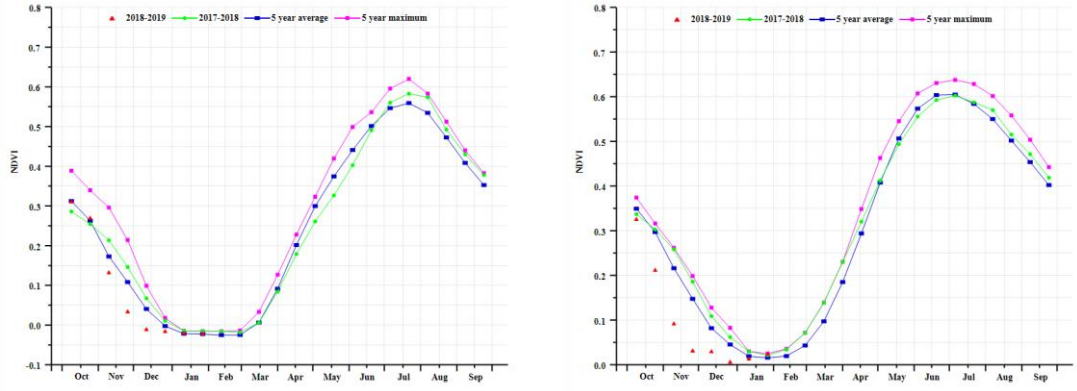

(b) Crop condition development graph based on NDVI



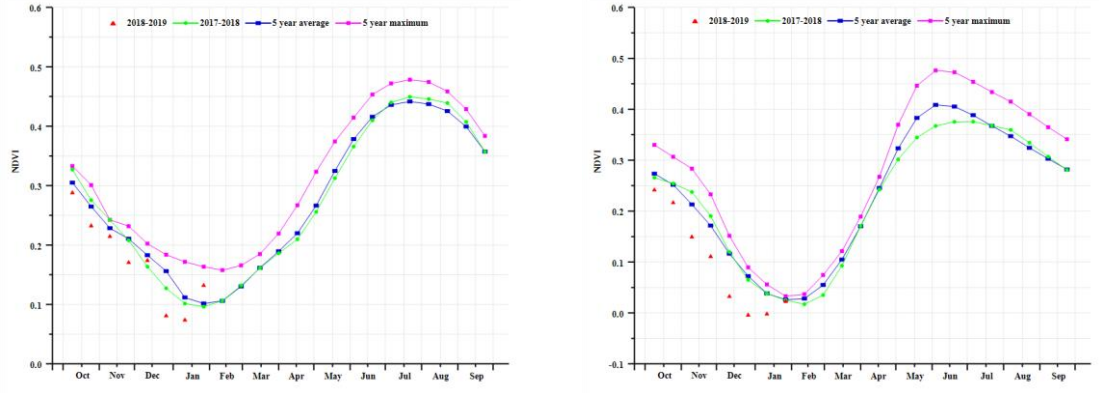

(c) Maximum VCI




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles




(f) Crop condition development graph based on NDVI in Northern region (left) Eastern plateau and southeastern region (right))




(g)Crop condition development graph based on NDVI in South region(left) and Central non-agricultural region (right)

**Table 3.37. Kazakhstan agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Northern region** | 144 | -1 | -7.6 | -0.5 | 301 | 4 |
| **Eastern plateau and southeastern region** | 224 | 3 | -5.6 | -0.1 | 462 | -2 |
| **South region** | 150 | 13 | 0.5 | -0.2 | 468 | -5 |
| **Central non-agriculture region** | 196 | 37 | -4.4 | -0.4 | 372 | 0 |

**Table 3.38. Kazakhstan, agronomic indicators by sub-national regions,current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Northern region** | 420 | -5 | 13 | 36 | 0.74 |
| **Eastern plateau and southeastern region** | 457 | -5 | 16 | -13 | 0.75 |
| **South region** | 562 | 13 | 4 | -24 | 0.73 |
| **Central non-agriculture region** | 561 | 7 | 3 | -68 | 0.55 |

# [KEN] Kenya

The large variety of rainfall patterns in Kenya, usually referred to as long rains (summer) and short rains (winter) defines cropping patterns (long rain maize and wheat, short rain maize). During the monitoring period, the long rain maize and wheat were harvested and the short rain maize was sown and started to grow. CropWatch agro-climatic indicators show that, at the national level, weather conditions were mostly unfavorable. This includes essentially below average RAIN (21%) while TEMP (-0.5°C departure), RADPAR (+1%) and CALF (+2%) were close to average. At the national level, crop condition was below average, which is confirmed by a significant decrease for the BIOMASS indicator (-13%) as direct result of low rainfall.

As shown by the NDVI development graph, national crop condition values were mostly below those for the five-year average. The national NDVI values began to improve during mid of January. NDVI was above average in 19.9% of arable land, mostly around North-west Kitui, Machakos and Kirinyaga, where VCIx mostly exceeds 1.00. Average conditions prevailed in 36.3% of cropland including Nyanza and Western provinces extending east to the previously mentioned area. The westernmost part of this area had satisfactory VCIx in the range from 0.8 to 1. Mostly below average NDVI prevailed, with fluctuations, in the other regions where the lowest VCIx (below 0.5, indicating below-average crops or range-land) occurs mostly in two patches, (1) in north-west Laikipia (24% rainfall deficit) and south-west Samburu (-36% rainfall deficit) as well as (2) in northern Uasin Gishu where the rainfall deficit reached 50%, the most severe in the country.

Country-wide, taking into account that maximum VCI nevertheless reaches 0.87 in the presence of widespread rainfall deficits except in some areas of the south-eastern quadrant of the country including Garissa, Kilifi, Kisumu, Kwale, Machakos, Makueni and Tana River. The largest but still modest departures occur in Kwale (+7%) and Kilifi (+12%) along the coast in the south-east where good soil moisture will be available for range-land growth and planting of crops from late March.

Generally, crop condition is currently assessed as fair to average.

## Regional analysis

Considering the cropping system, climatic zones and topographic conditions we divided this country into three agro-ecological regions: The Eastern Coastal Area, the Northern region with sparse vegetation and Southwest Kenya.

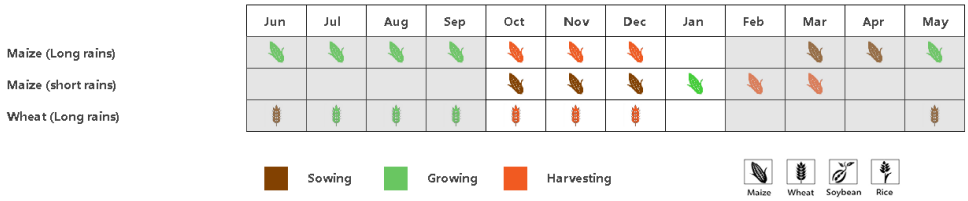
The northern region with sparse vegetation recorded scarce rainfall (RAIN at 162 mm, or 26% below average), which affects Turkana, Samburu, West Pokot, and Baringo. The deficit leads to a decrease in BIOMASS of 18%. The temperature was below average by -0.1°C and RADPAR was slightly up by 1%. The NDVI development curve shows values below the five years average until mid-December. The maximum VCI was nevertheless high at 0.81 with slightly increased in CALF (CAL, +2%). Overall, based on CropWatch agronomic, agro-climatic indicators and NDVI cluster and profile the condition is assessed as unfavorable. Since the region is mostly pastoral the prevailing conditions had a negative effect on livestock production.

The Eastern Coastal Area includes Mandera, Maralal, Marsabit, Wajir, and Isiolo; unlike the previous region, this area recorded 231 mm (4% above average), whereas TEMP was average (-0.1°C) and RADPAR was above by 3%. Even though the total amount of rainfall was above average, the total biomass production potential was below the five-years average (BIOMASS, -3%). The NDVI profile was above average with marked fluctuations at the start of the reporting period. Throughout the reporting period, maximum VCIx was 0.94 with CALF at 7 %, indicating mostly environmental conditions.

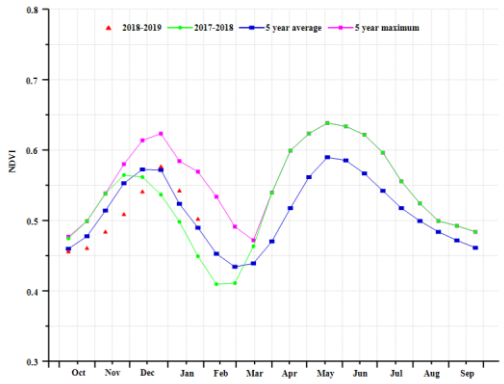
The Southwest of Kenya includes Narok, Kajiado, Kisumu, Nakuru, and Embu, major producers of long rain wheat and maize. From the national crop phenology map, the reported period was

harvesting time. Compared to the above two regions this region received high rainfall with higher negative departure (244 mm, 23% below average). The temperature was also below average (-0.6°C departure), which resulted in a reduction of total biomass production (BIOMASS at -14%). CALF increased by 1%. The NDVI based Crop condition development shows values below the five years average from October to December with above-average values in January. VCI reached 0.86. Based on the above indicators and fluctuations of NDVI profile over time, crop condition is assessed as close to but below average.

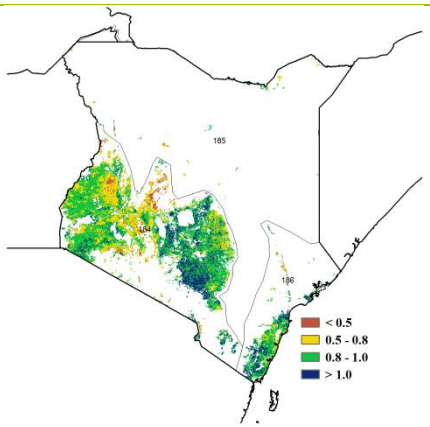
**Figure 3.24. Kenya's crop condition, October 2018 - January 2019.**



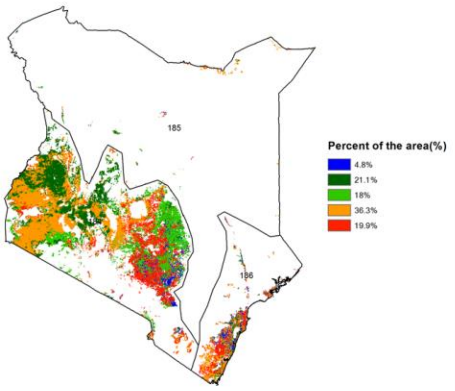

(a). Phenology of major crops



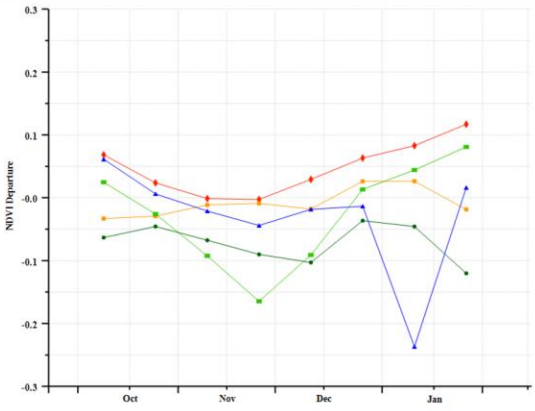

(b) Crop condition development graph based on NDVI



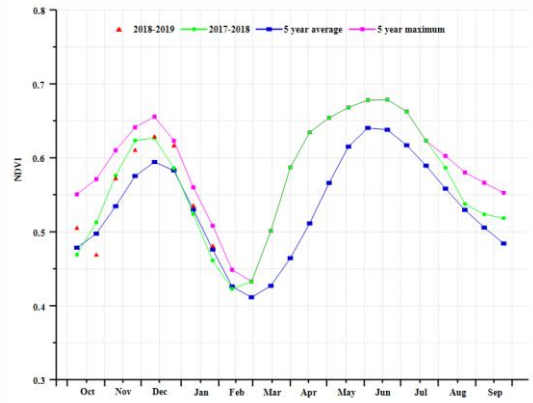

(c) Maximum VCI

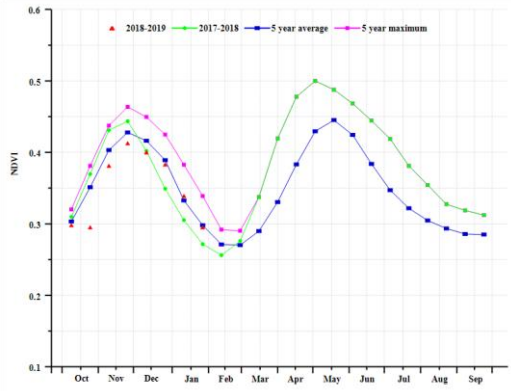



(d) Spatial NDVI patterns compared to 5YA

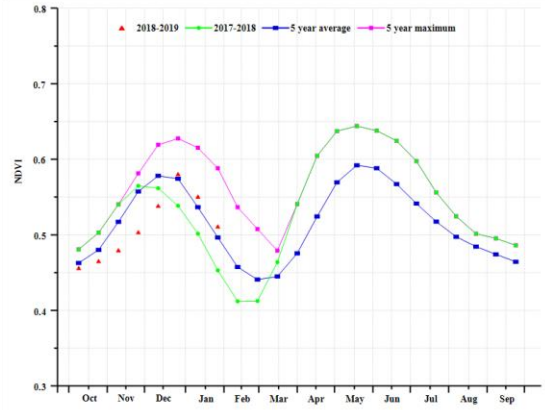



(e) NDVI profiles




(f) Crop condition development graph based on NDVI ( Southwest of kenya, and (g) Northern region with sparse vegetation




(g) Crop condition development graph based on NDVI, Eastern Coastal area

**Table 3.39. Kenya's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Eastern Coastal Area | 231 | 4 | 28.0 | -0.1 | 1421 | 3 |
| Northern region with sparse vegetation | 162 | -26 | 25.8 | -0.1 | 1329 | 1 |
| Southwest of Kenya | 244 | -23 | 20.4 | -0.6 | 1279 | 1 |

**Table 3.40. Kenya's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Eastern Coastal Area | 687 | -3 | 98 | 7 | 0.94 |
| Northern region with sparse vegetation | 561 | -18 | 72 | 2 | 0.81 |
| Southwest of Kenya | 855 | -14 | 97 | 1 | 0.86 |

# [KHM] Cambodia

October to January covers the growing period of the main (wet season) rice, and the early stage of the second (dry season) rice in Cambodia. Crop condition was globally average. The fraction of cropped arable land was slightly above the average of the previous five years (+2%). Compared to average, the CropWatch agro-climatic indicators describe a relatively dry season with a 20% drop in rainfall. Air temperature was about average and radiation was slightly up (+6%). Environmental indicators mentioned above caused a 2% decrease in the biomass production potential (BIOMSS).

Unsatisfied water requirements did harm crops, especially rice, and resulted in well below average crops over most of the season, which is clearly displayed by the NDVI profile. A small area (6.6% or cropland) near western Tonle Sap suffered a drop in NDVI deficit early of the season, but recovered since December 2019. Vegetation condition indices (VCIx) are high (>0.8) in most parts of the country, which means drought condition influences only part of the entire growing season and might be remedied by sufficient water supplying.

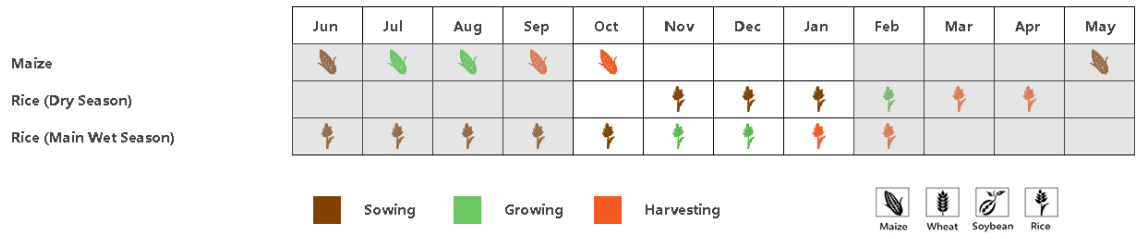
**Regional analysis**

Based mostly on climate differences, two agro-ecological regions can be distinguished in Cambodia. Weather in the Tonle Sap lake area (especially rainfall and temperature) is mainly influenced by the lake itself. The second area, referred to as the "upland area" covers the region outside the Tonle Sap basin along the border with Thailand and Laos in the north and Vietnam in the east.

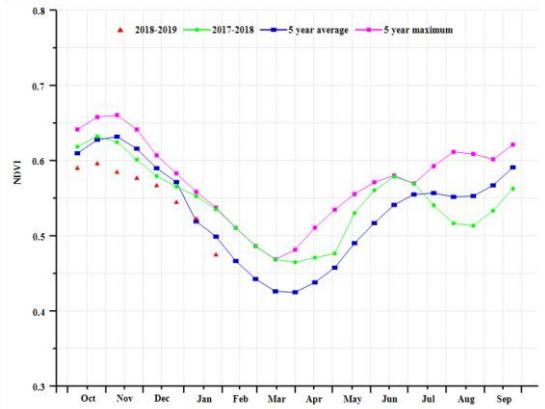
In the **Tonle Sap lake area**, which is mainly affected by upland and Mekong river water supply, NDVI behaved similarly to the entire country. Crop condition went well below average before January but has recovered slightly since then.

The **Upland Area** differs from the Tonle Sap basin in that it is more directly affected by the monsoon. It recorded 381mm of rainfall, above the Tonle Sap region precipitation, but still 15% below average. The two regions share similar air temperature and radiation. Compared with the average of the previous five years, BIOMSS increased 1%

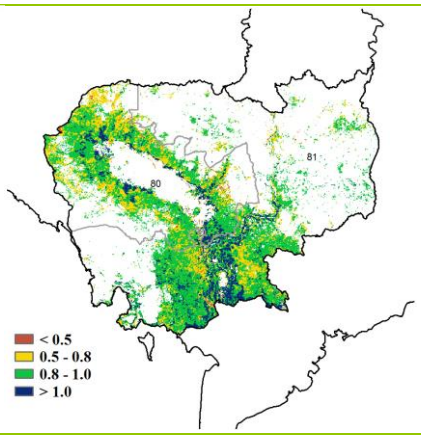
**Figure 3.25. Cambodia's crop condition, October 2018 – January 2019**



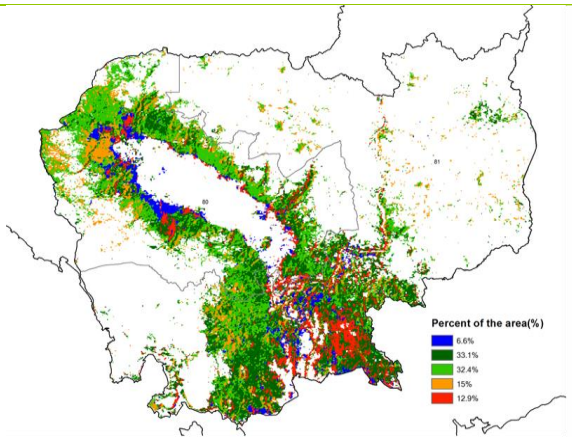

(a). Phenology of major crops



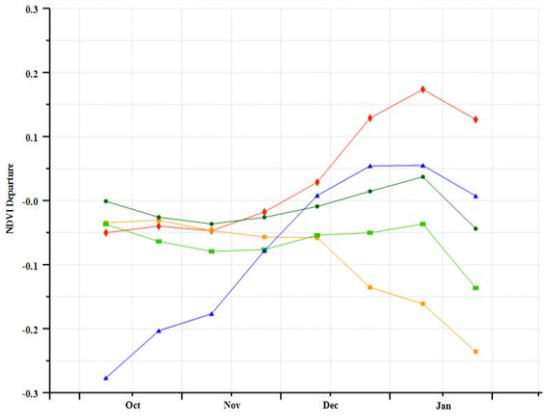

(b) Crop condition development graph based on NDVI



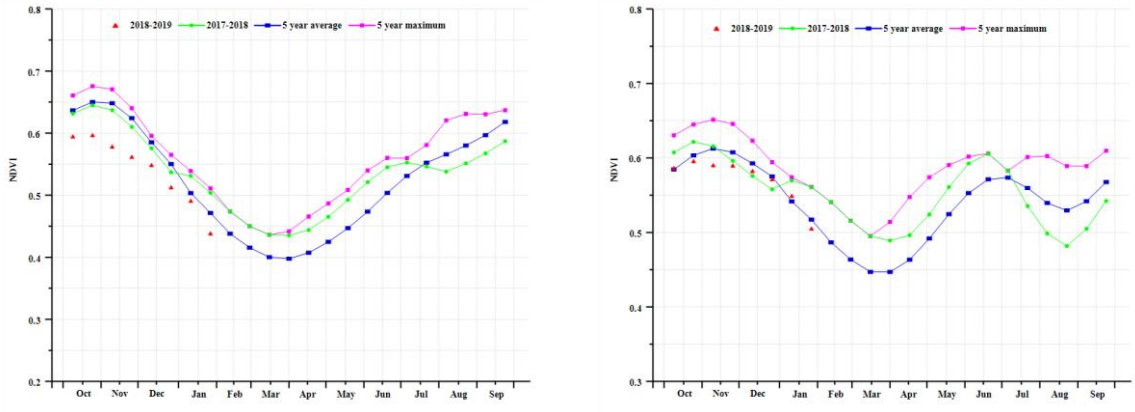

(c) Maximum VCI




(d) Spatial NDVI patterns compared to 5YA




(e) NDVI profiles




(f) Crop condition development graph based on NDVI_Central Tonle-Sap plain (left) a and Upland areas (right))

**Table 3.41. Cambodia agroclimatic indicators by sub-national regions,current season's values and departure from 15YA, October 2018-January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| **Main cropping area (Cambodia)** | 292 | -29 | 25.5 | -2.1 | 1133 | 6 |
| **Lake plains (Cambodia)** | 381 | -15 | 25.4 | -1.9 | 1134 | 6 |

**Table 3.42. Cambodia, agronomic indicators bysub-national regions, current season's values and departure from 5YA, October 2018-January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/$m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Main cropping area (Cambodia)** | 842 | -6 | 99 | 1 | 0.86 |
| **Lake plains (Cambodia)** | 1007 | 1 | 98 | 3 | 0.90 |

# [LKA] Sri Lanka

Maha (October to March) and Yala (April to September) are the main agricultural seasons in the wet areas in Sri Lanka. The driest area (in the east) tends to have only one rain-fed season (Maha) while the south-west enjoys a very long season with bimodal rainfall. Farmers cultivate maize and rice in rotation during both seasons. The monitoring period thus covers sowing and early growth of Maha maize and rice.

Crop condition over Sri Lanka was generally slightly below average.

The agro-climatic indicators showed minor change compared to average. Rainfall and radiation increased by 2% and 3%, while temperature dropped 0.6℃. The cropped arable land fraction (CALF) was 100%, 1% up compared to 5-year average, showing fully utilized cropland. BIOMSS is 2% up compared to 5-year average. According to the national NDVI development graph crop condition was initially low in early October (lower than the 5-year average) but improved, reaching average values by late November and above average and even the 5-year maximum in early January. Values fell again to below average in late January but, at 0.98, maximum VCI stands for unusually good crop condition.

Spatial variability was significant throughout the country according to spatial NDVI patterns and profiles. In 42.5% of cropland, mostly in the south-east (centered around Uva province) , crops were perfectly average throughout the early Maha season. Negative departures occurred at different times and in different areas: (1) early in the season in 19.2% of cropland, located mostly in the districts from Galle to south Puttalam on the western coast; (2) late November in scattered locations in central Sri Lanka (9% of cropped areas, in Polonnarua and south Anradhapura); (3) late January from north Amapara to south Trincomalee districts. The maximum VCI map, however, indicates favorable values over the whole country with values below 0.8 in few areas only (e.g. central Ratnapura district).

**Regional analysis**

Based on the cropping system, climatic zones and topographic conditions, three sub-national agro-ecological regions can be distinguished for Sri Lanka. They are the Dry zone, the Wet zone, and the Intermediate zone.

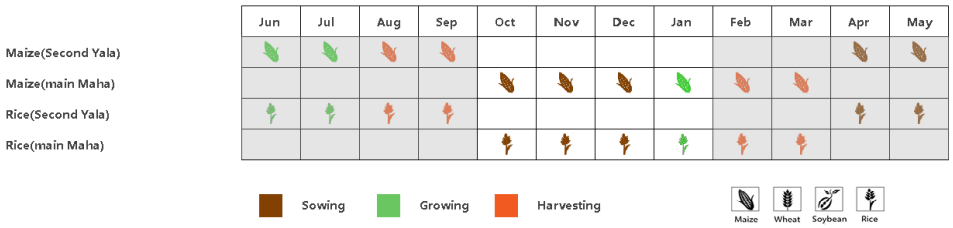
The Dry zone, which is the largest of the three and located in the eastern half of the country (from north to south) showed agro-climatic conditions akin to those of the whole country. Rainfall and radiation increased by 1% and 3% while temperature decreased by 0.6℃, compared to average. Crop condition was also similar to the nationwide situation. The maximum VCI map displays some isolated low values along the coast. Crop condition is satisfactory.

The Wet zone covers the smallest area (in the south-west) as well as the most favorable agro-climatic condition among three sub-national regions. The rainfall and radiation were above average by 11% and 5%, while temperature was below average by 0.5℃. Crop condition is average.

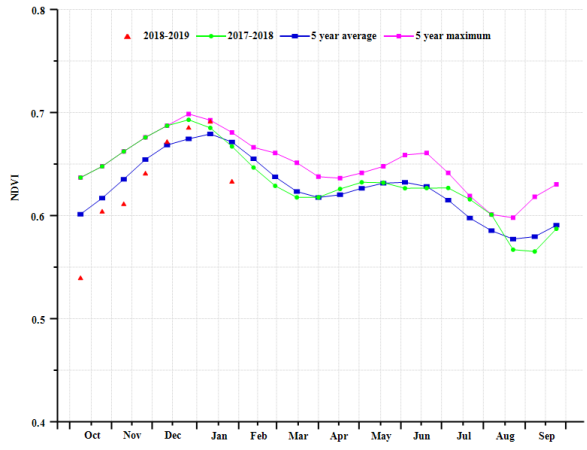
The Intermediate zone is located between Dry zone and Wet zone. Agro-climatic indicators were the “least favorable” among the three sub-national regions, although the wording hides the fact total rainfall was in the range of 900 mm, i.e. amply sufficient for any type of crop. The rainfall and temperature both were slightly below average while radiation increased by 2%. According to the NDVI development graphs, crop condition was average(VCIx at 0.97)

Mostly on the basis of fully utilized cropland, close to average agro-climate and very high VCI (0.99, 0.93 and 0.97 respectively), crop prospects are assessed as fair to good.

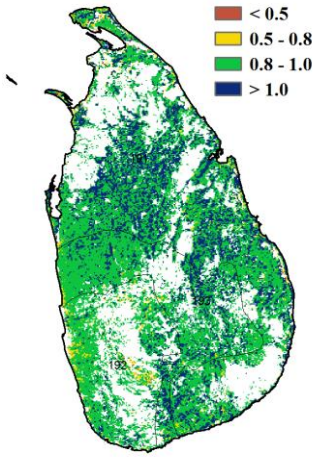
**Figure 3.26. Sri Lanka’s crop condition, October 2018 - January 2019**



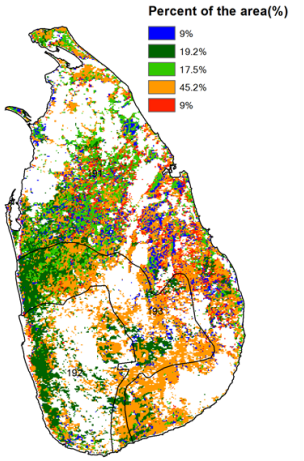

(a). Phenology of major crops

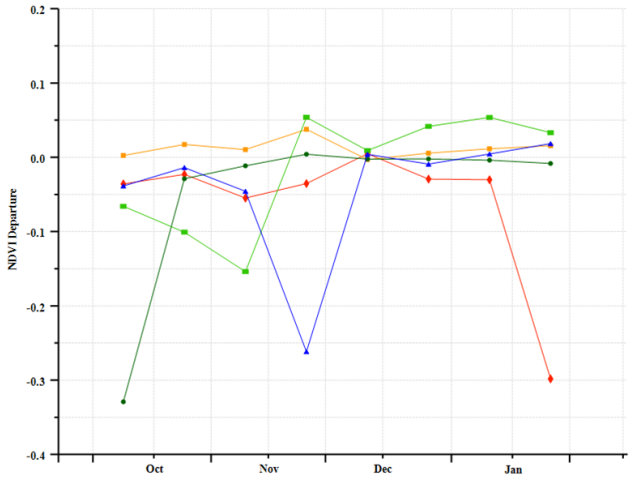



(b) Crop condition development graph based on NDVI



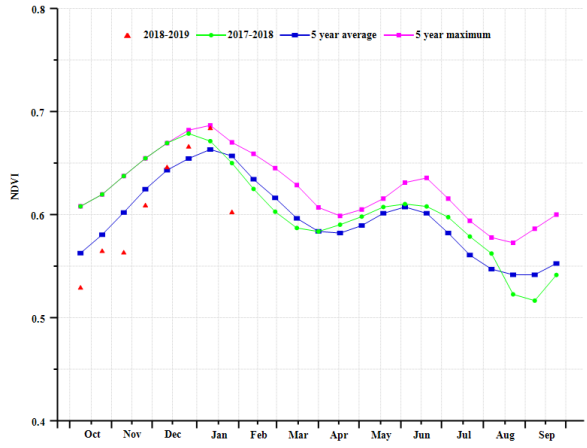

(c) Maximum VCI

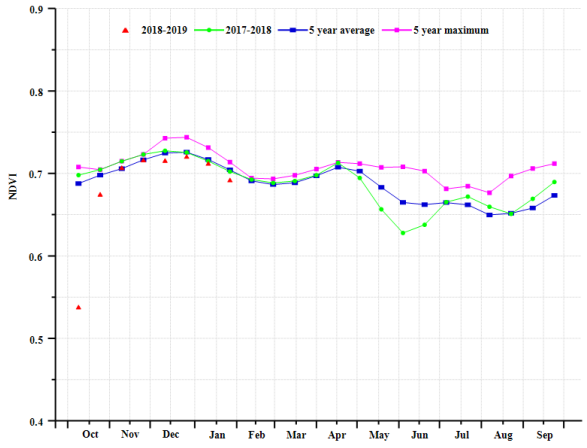


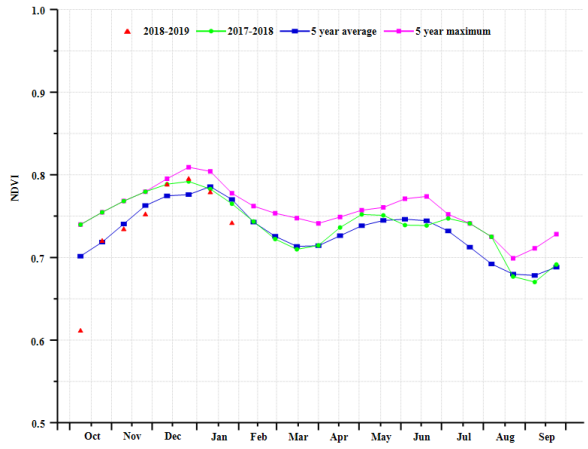

(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



(f) Crop condition development graph based on NDVI(Dry zone (left) and Wet zone (right))




(g) Crop condition development graph based on NDVI (Intermediate zone)

**Table 3.43. Sri Lanka's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Dry zone | 886 | 1 | 26.7 | -0.6 | 1129 | 3 |
| Wet zone | 997 | 11 | 23.8 | -0.5 | 1070 | 5 |
| Intermediate zone | 908 | -5 | 25.8 | -0.6 | 1031 | 2 |

**Table 3.44. Sri Lanka's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Dry zone | 1733 | 3 | 100 | 1 | 0.99 |
| Wet zone | 1911 | 2 | 100 | 0 | 0.93 |
| Intermediate zone | 1841 | 1 | 100 | 0 | 0.97 |

# [MAR] Morocco

Winter wheat was sown during the reporting period in Morocco; it is currently in late dormancy or growing. RAIN and TEMP were below the average (by 17% and 0.5 °C, respectively) and so was BIOMASS (-13%) while RADPAR was 2% above average. The estimated nationwide maximum VCI was 1 and CALF was 29% above average. The nationwide NDVI development graph values exceed 5-year maximum condition. The map of VCIx shows that values were high nationwide except for the North coast of Oriental region and the west coast of both Guelmim-Oued Noun and Laâyoune-Sakia El Hamra regions where ranged from low (< 0.5) to moderate (0.5 - 0.8). The spatial NDVI patterns map shows that only 10% of the cropped area experienced below the average condition after mid-December. In general, all CropWatch indicators concur to assess crop condition as about average..

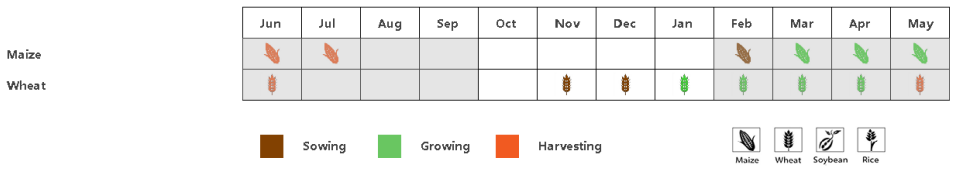
**Regional analysis**

CropWatch adopts three agro-ecological zones (AEZs) relevant for crop production in Morocco. The first is the Cool sub-humid zone, the second is the Warm semi-arid zone, while the third zone is Warm-sub-humid.

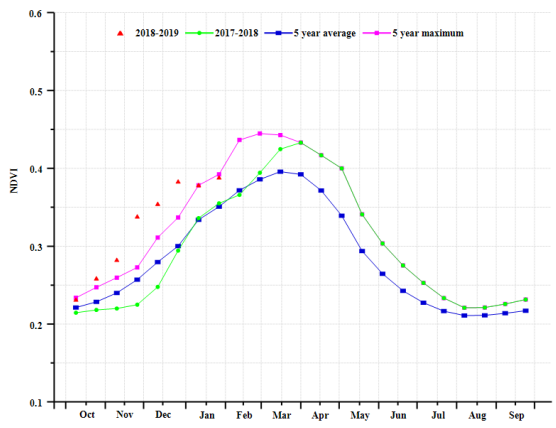
For the three AEZs, the average rainfall (RAIN) was below average (by 20, 23, and 13% respectively). Also, the average TEMP for the three zones was below the average (by 0.4, 0.5, and 0.6 °C, respectively). The drop in average RAIN resulted in a drop in estimated BIOMSS for the AEZs (18, 13, and 12 % below the average, respectively), while the RADPAR was average for first and third zones, the second zone Warm semi-arid zone had 4% above average sunshine.

NDVI-based graphs indicating above 5-year maximum conditions for the Cool sub-humid zone and the warm sub-humid zones, and at or above maximum conditions for the Warm semi-arid zone. This is consistent with the VCIx estimates since the highest VCIx (1.22) corresponds to the Cool sub-humid zone. The other two zones had also very high VCIx value ( ≥1), indicating nationwide favorable crop conditions in spite of the precipitation deficit.

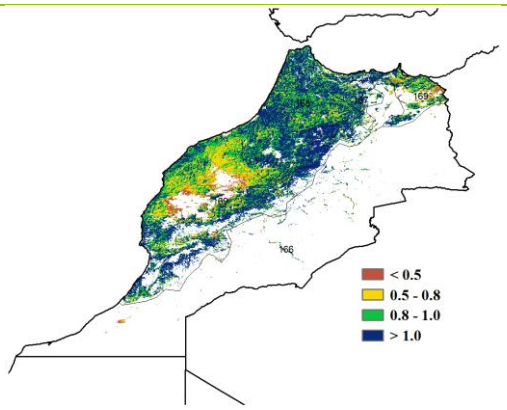
**Figure 3.27. Morocco's crop condition, October 2018 - January 2019**



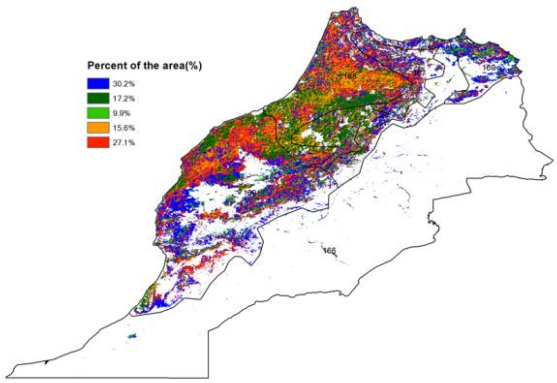

(a). Phenology of major crops

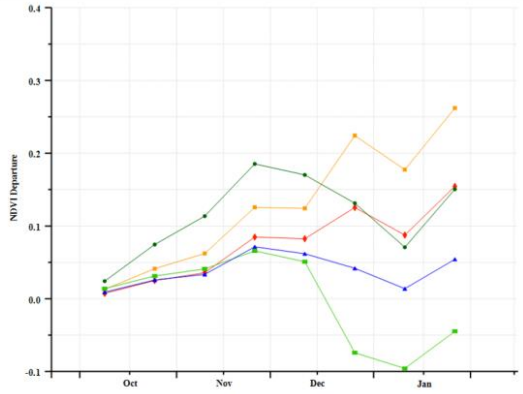



(b) Crop condition development graph based on NDVI

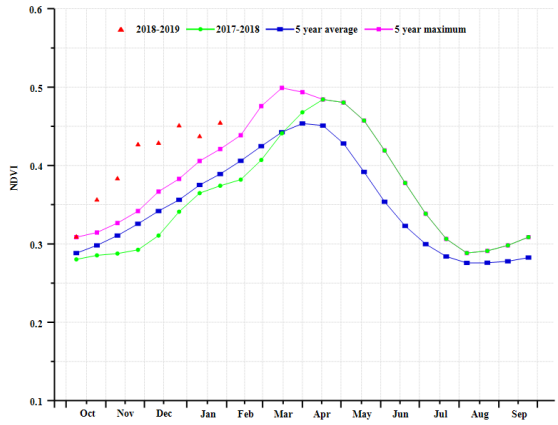


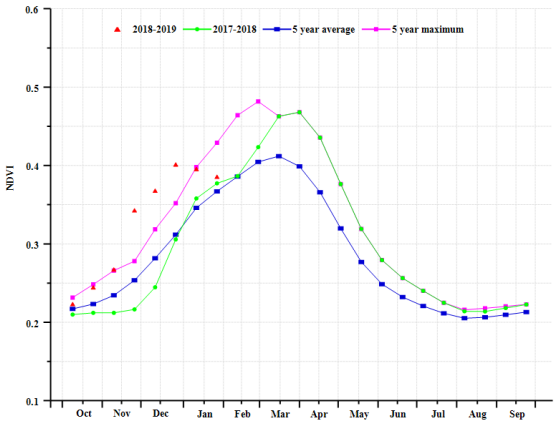

(c) Maximum VCI



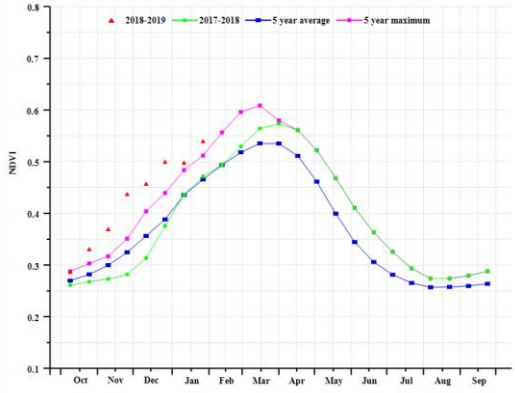




(d) Spatial NDVI patterns compared to 5YA € NDVI profiles




(f). Crop condition development graph based on NDVI (warm semiarid zones).and (g). warm sub humid zones )




(h) . crop condition development graph based on NDVI, Cool subhumid zone.

**Table 3.45. Morocco's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Warm semiarid zones | 154 | -20 | 10.6 | -0.4 | 718 | 0 |
| Warm sub-humid zones | 112 | -23 | 12.7 | -0.5 | 835 | 4 |
| Cool sub-humid zones | 198 | -13 | 13.1 | -0.6 | 720 | 0 |

**Table 3.46. Morocco's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/$m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Warm semiarid zones | 568 | -18 | 64 | 37 | 1.22 |
| Warm sub-humid zones | 424 | -13 | 42 | 21 | 1.00 |
| Cool sub-humid zones | 661 | -12 | 82 | 39 | 1.11 |

# [MEX] Mexico

During the monitoring period, both maize and rice reached maturity. Maize has been harvested in the north-eastern part of Mexico, while in other areas it was harvested from During the monitoring period, both maize and rice reached maturity. Maize has been harvested in the north-eastern part of Mexico, while in other areas it was harvested from January. Rice was harvested as well, whereas winter wheat, which was planted from October, is still growing. Soybean has been harvested after December. Overall, crop condition was close to average, as shown by the crop condition development graph based on NDVI.

Temperature (-0.5°C from average) and radiation (3% below average) were close to average but rainfall exceeded the average by 23%. This was beneficial for crop growth and is confirmed by a high value of maximum VCI (0.93). CALF increased by 6%, compared with the previous 5-year average.

**Regional analysis**

Based on cropping systems, climatic zones and topographic conditions, Mexico is divided into four agro-ecological regions. They include Arid and semi-arid regions (82), Sub-humid temperate region with summer rains (84), Sub-humid hot tropics with summer rains (85) and Humid tropics with summer rainfall (83). Regional analyses of crop situation can provide more details for the production situation in Mexico.

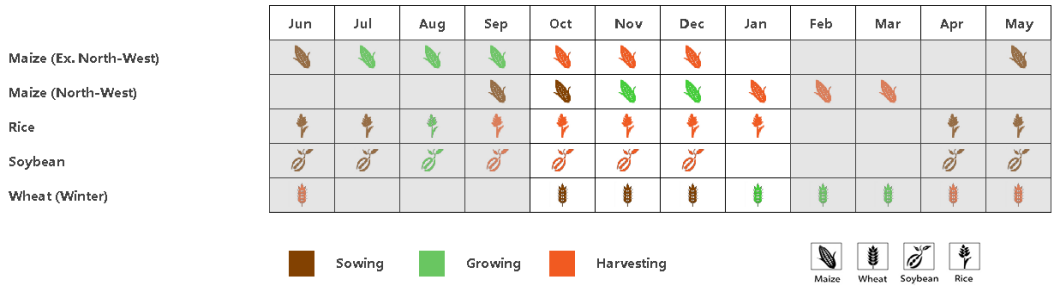
The **Arid and semi-arid regions** are located in northern and central Mexico; they account for about half of planted areas in the country. Agro-climatic conditions were moderate over the reporting period. Rainfall rose 58% above average while temperature declined by 1.0°C. BIOMSS reached 551gDM/m2 and was above average by 58%. Radiation dropped 5%. The maximum VCI was high, with a value of 0.91. Moreover, CALF increased by 15% compared with last 5 years average. The situation of crop production in these regions is promising.

**Sub-humid temperate region** with summer rains is situated in central Mexico. Crop condition in this region was below average from October to January. The agro-climatic conditions were, however, globally favorable: rainfall was up 54% but temperature and radiation decreased by 0.2°C and 8%, respectively, compared to average. The resulting BIOMSS increase is 51% above the 5YA. Note that the drop in NDVI that occurred in this region and the next at the end of October, which is also very visible in the spatial NDVI profiles (2.6% of arable land is shown as affected) is due to hurricane Willa (20-24 October). Refer to the section on disasters for the context.

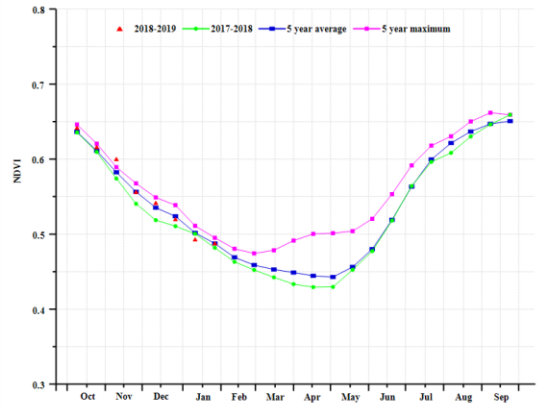
In the **Sub-humid hot tropics with summer rains** (located in southern Mexico) crop condition was continuously below average according to the NDVI time profiles. Agro-climatic conditions were moderate, with a +47% departures from average for rainfall but temperature and radiation deviating only by -0.4°C and -4%, respectively, from the average. BIOMSS increased above average by 43%.

The **Humid tropic with summer rainfall area is** located in southeastern Mexico. Precipitation, temperature and radiation were 355mm, 24.6°C and 1000MJ/m2, respectively. The region is the only one in Mexico with a precipitation deficit, which amounts to 15% of average. Temperature and radiation were average. Biological growth potential fell 10% but nevertheless VCIx reached 0.93.

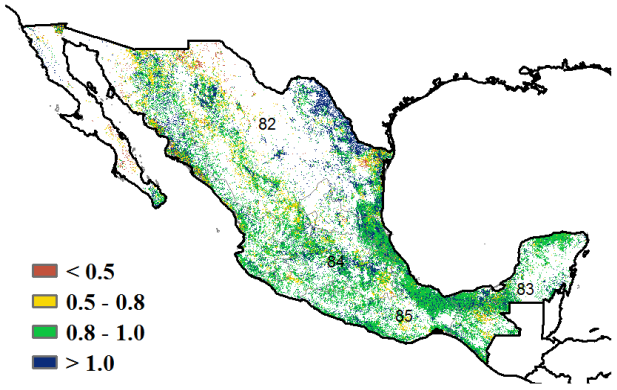
**Figure 3.28. Mexico's crop condition, October 2018 - January 2019**



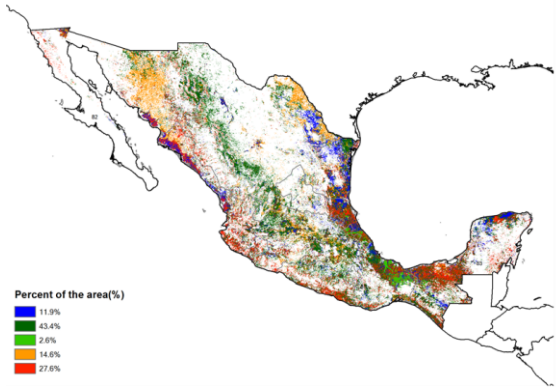

(a). Phenology of major crops



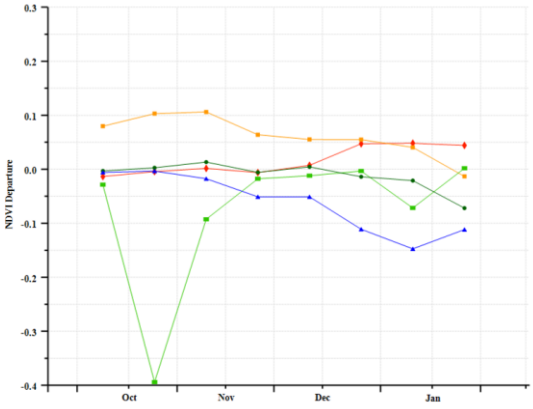

(b) Crop condition development graph based on NDVI



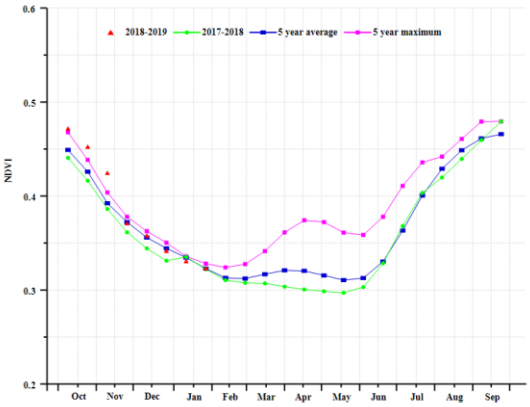

(c) Maximum VCI

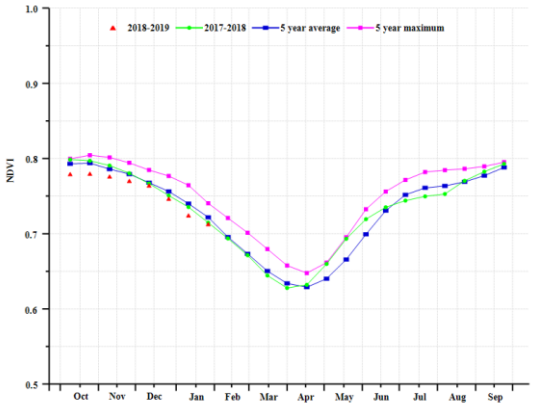



(d) Spatial NDVI patterns compared to 5YA

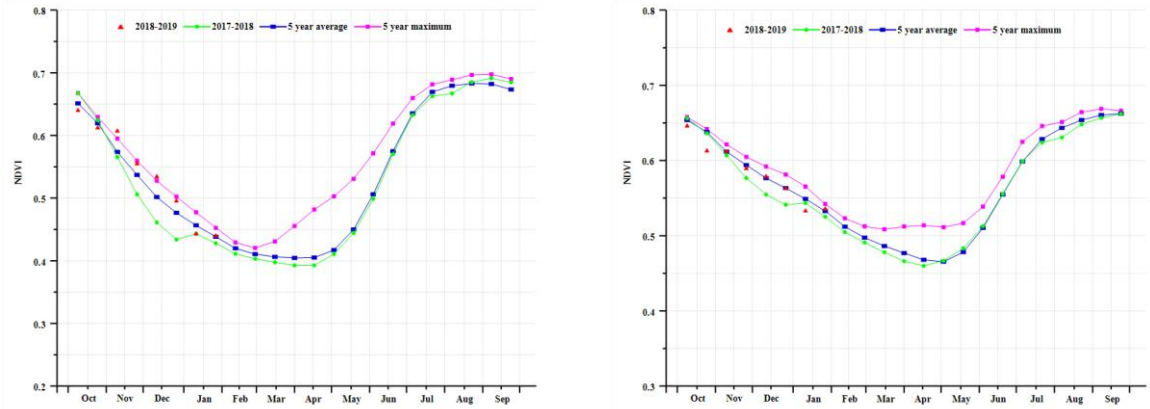



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Arid and semi-arid regions (left) and Humid tropics with summer rainfall (right))




(g) Crop condition development graph based on NDVI (Sub-humid temperate region with summer rains (left) and Sub-humid hot tropics with summer rains (right))

**Table 3.47. Mexico's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 to January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| **Arid and semi-arid regions** | 149 | 58 | 14.4 | -1 | 921 | -5 |
| **Sub-humid temperate region with summer rains** | 161 | 54 | 17.5 | -0.2 | 1010 | -8 |
| **Sub-humid hot tropics with summer rains** | 265 | 47 | 20.6 | -0.4 | 984 | -4 |
| **Humid tropics with summer rainfall** | 355 | -15 | 24.6 | -0.1 | 1000 | 4 |

**Table 3.48. Mexico's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 to January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Arid and semi-arid regions** | 551 | 58 | 82 | 15 | 0.91 |
| **Sub-humid temperate region with summer rains** | 608 | 51 | 97 | 3 | 0.93 |
| **Sub-humid hot tropics with summer rains** | 758 | 43 | 98 | 2 | 0.94 |
| **Humid tropics with summer rainfall** | 850 | -10 | 100 | 0 | 0.93 |

# [MMR] Myanmar

The monitoring period covers the harvest of the monsoon season rice ("main rice") as well as the irrigated cool season "second rice", maize and wheat. According to CropWatch monitoring results, crop condition was generally close to the 5-year average during the monitoring period.

Compared with average, nation-wide rainfall was up 22%; temperature, sunshine were about average (TEMP -0.1°C, RADPAR, -1%) and the biomass accumulation potential is up (BIOMSS +24%). According NDVI development graphs crop condition was just below average, and exceeding it in January. Together with the high maximum VCI value (0.92) NDVI suggests that crop condition is satisfactory in Myanmar.

With regard to spatial distributions, the whole country went through an unfavorable situation during the monitoring period in terms of spatial NDVI patterns. The NDVI departure values remained negative all the time, while near to zero in late October, late December and early January. The maximum VCI map displays satisfactory condition for Myanmar, with high values in most of the country and relatively low values in a few areas in Sageing, Magwe and Mandalay.

**Regional analysis**

Based on the cropping system, climatic zones and topographic conditions, three sub-national agro-ecological regions (AEZ) can be distinguished for Myanmar. They are the Coastal region, the Central plain, and the Hills region.

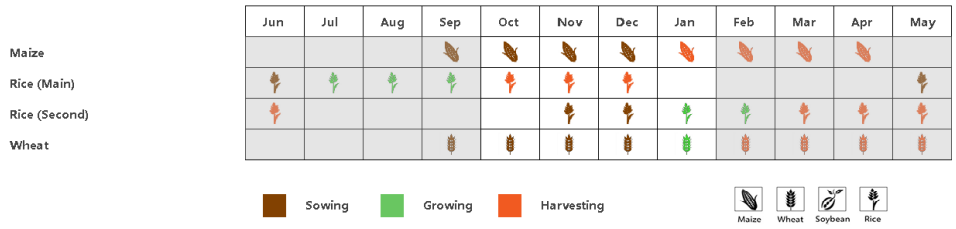
There is little difference between the three AEZ as far as agronomic indices are concerned. The CALF for three sub-national zones is 0.99 and 1% above the average, and VCIx values are above 0.90. The BIOMSS indices, however, displayed different increases over average: 38%, 19% and 22%, respectively.

The Coastal area is located in south-western Myanmar and cultivates mainly maize in Ayeyarwady Region, Yangon Region, Mon State, Tanintharyi Region and southern Bago Region. The Coast experienced the most favorable conditions among the three AEZs. Rainfall exceeded average by 31% and both Temperature and sunshine were average (TEMP up 0.2℃). Crop condition was average.

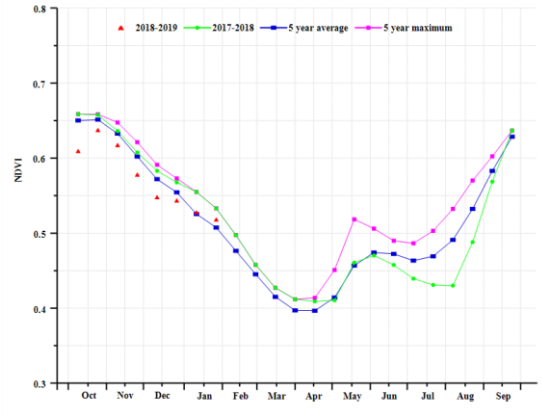
The Central plain covers Magwe Region, Mandalay Region and northern Bago Region, the main rice growing areas in Myanmar. Agro-climatic conditions were not as favorable as in the other AEZs. Rainfall was above average (RAIN +13%) while temperature and sunshine was average (TEMP -0.2℃ and RADPAR -2%). The condition of crops was fair but below average locally.

In the West, North and East of Myanmar, the Hills include Shan State, Kachin State, Sagaing Region, Chin State and Rakhing State. Maize is the main crop. Compared with average, rainfall and sunshine logically varied in opposite directions, while temperature was unaffected (RAIN +25%, TEMP -0.2℃ and RADPAR -1%). NDVI was low at the beginning of October, which may result from early harvest or from below average main rice. For the secondary crops, conditions are average..

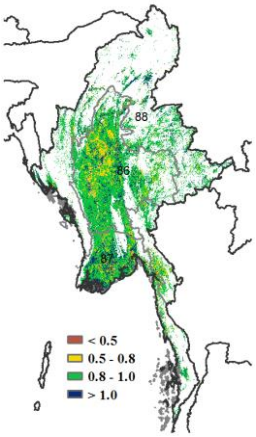
**Figure 3.29. Myanmar's crop condition, October 2018 - January 2019**



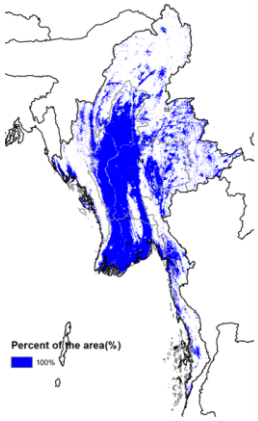

(a). Phenology of major crops

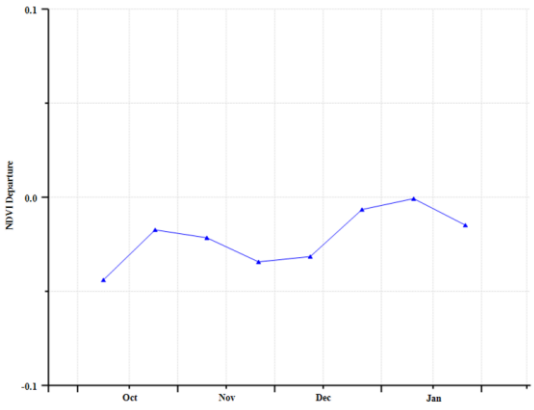



(b) Crop condition development graph based on NDVI



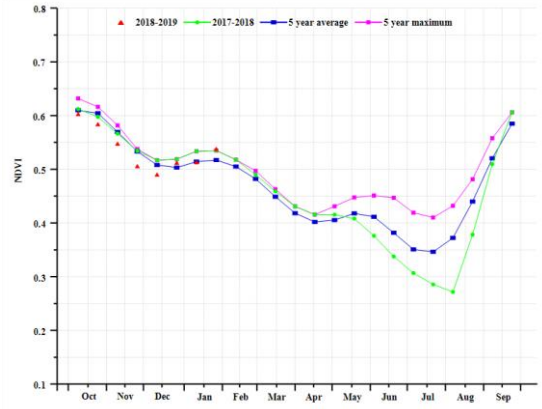

(c) Maximum VCI

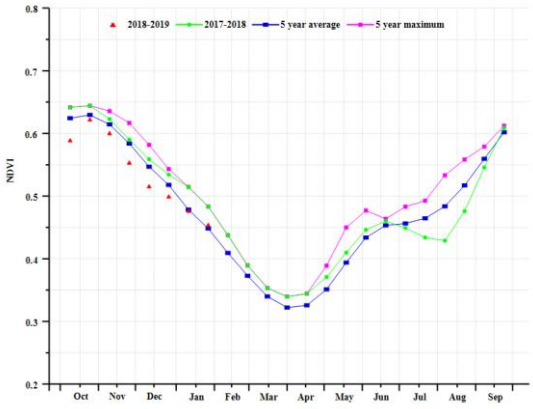


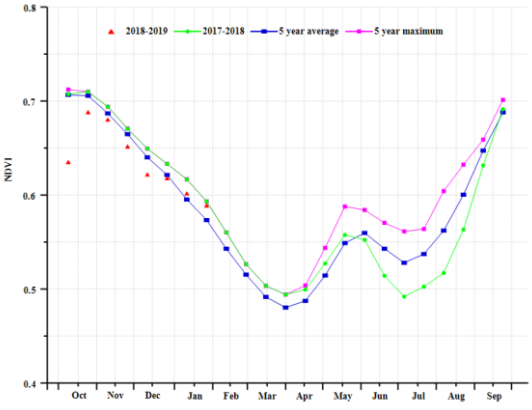

(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Coastal region (left) and Central plain (right))



(g) Crop condition development graph based on NDVI (Hill region)

**Table 3.49. Myanmar's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Coastal region | 1984 | 13 | 27.1 | 0.3 | 1085 | 1 |
| Central plain | 913 | -5 | 26.7 | -0.6 | 1046 | 0 |
| Hill region | 1301 | 2 | 24.4 | -0.5 | 930 | -3 |

**Table 3.50. Myanmar's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Coastal region** | 973 | 38 | 99 | 1 | 0.93 |
| **Central plain** | 731 | 19 | 99 | 1 | 0.91 |
| **Hill region** | 750 | 22 | 99 | 1 | 0.93 |

# [MNG] Mongolia

The monitoring period covers the late harvesting stage of wheat in October; due to low winter temperature (the national average is -15.1°C) there are no winter crops in Mongolia.

Among the CropWatch agro-climatic indicators, RAIN was below average (-15%); RADPAR and TEMP were above average (1% and 1.6°C). The contribution of the ONDJ period to annual biomass accumulation (BIOMSS) is up 11% compared to average. As shown by the NDVI development graph, values were below average from October to early November and above average from late November to January late. Since Mongolia is a rather dry country with precipitation averages between 30 and 100 mm during the reporting period, snow is infrequent and NDVI can provide information about range-land condition and biomass.

**Regional analysis**

Of the five agro-ecological zones of Mongolia, three are covered in this bulletin; all are located in the non-Gobi northern half of the country. They are referred to (from central-west Mongolia to the East) as Khangai Khuvsgul region (64 mm of average RAIN, -16.2°C average TEMP), Selenge Onon region (averages: 85 mm, -14.7°C) and the Central and Eastern Steppe Region, the wettest and "warmest" of the three (averages: 104 mm, -14.2°C).

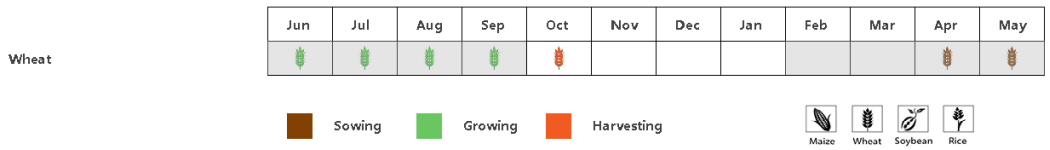
NDVI was below the five year average from October to December and above average from November to January in the Khangai Khuvsgul region. It exceeded the five-year maximum from December to January. RAIN and RADPAR were above average (+10% and 1%) and TEMP was also above average (0.7°C). The combination of the factors resulted in high BIOMSS (+11%) compared to the five −year average. The two southern AEZ, which are not described in detail, experienced above-average rainfall as well (+19% and +33%), which will favor rangeland development.

The Selenge Onon region recorded above average NDVI from November to January and above the five years maximum from December to January. Accumulated rainfall was below average (RAIN -16%) and RADPAR and TEMP were above average (+1% and 1.9°C). The BIOMSS index increased by 15% compared to average.

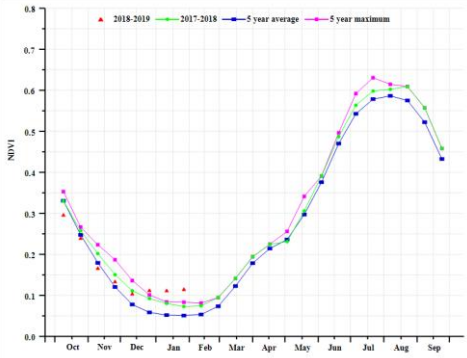
In the Central and Eastern Steppe Region, NDVI was below the five year average in October and above the five-year maximum from late November to January late. RAIN was below average (-56%) and TEMP was well above average (2.8°C), while BIOMSS index decreased by 12%. Prospects form abundant range-land growth is less favorable than in the two other AEZs.

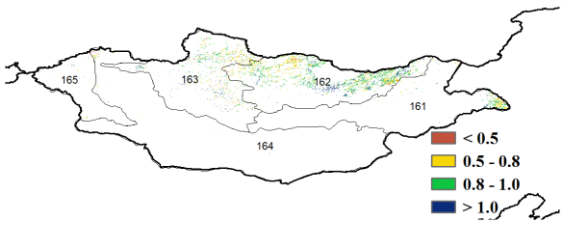
.

**Figure 3.30. Mongolia's crop condition, October 2018 - January 2019**

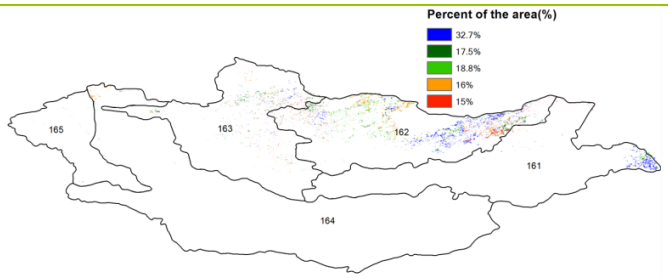


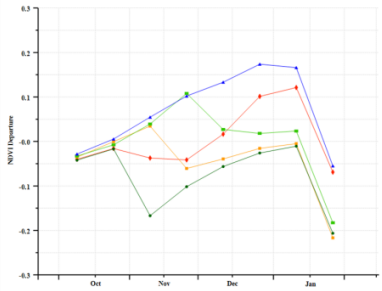

(a). Phenology of major crops



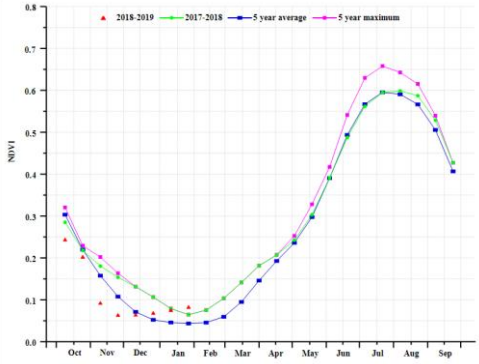



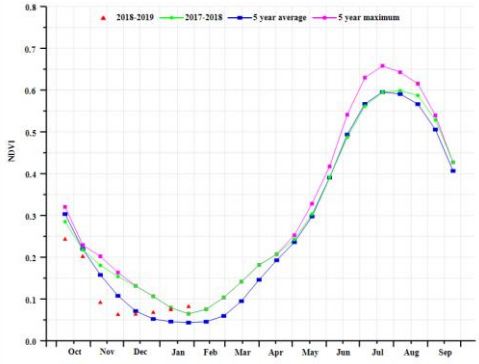

(b) Crop condition development graph based on NDVI (c) Maximum VCI



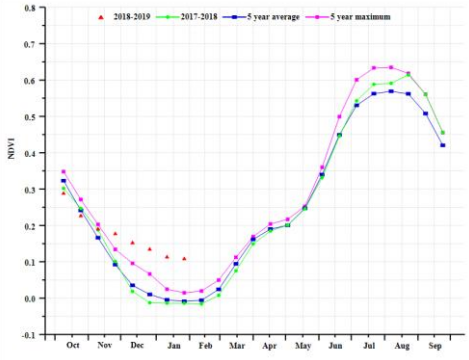



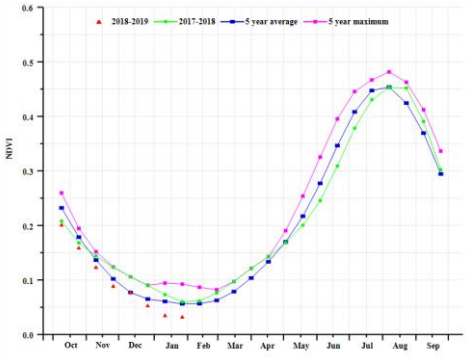

(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



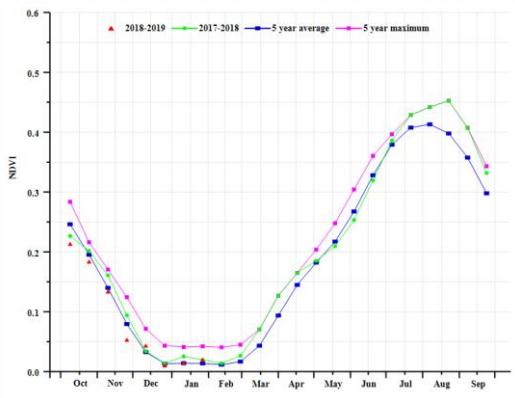




(f) Crop condition development graph based on NDVI Hangai Khuvsgul Region (left), and Selenge –Onon Region (right))




(g) Crop condition development graph based on NDVI Central and Eastern Steppe Region (left), and Altai Region (right))




(h) Crop condition development graph based on NDVI (Gobi Desert Region)

**Table 3.51. Mongolia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| Hangai Khuvsgul Region | 70 | 10 | -15.5 | 0.7 | 468 | 1 |
| Selenge-Onon Region | 71 | -16 | -12.8 | 1.9 | 460 | 1 |
| Central and Eastern Steppe Region | 46 | -56 | -11.4 | 2.8 | 459 | 0 |
| Altai Region | 90 | 33 | -13.9 | 0.0 | 436 | 1 |
| Gobi Desert Region | 45 | 19 | -16.5 | 0.0 | 429 | 0 |

**Table 3.52. Mongolia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| Hangai Khuvsgul Region | 201 | 11 | 5 | 21 | 0.83 |
| Selenge-Onon Region | 263 | 15 | 23 | 36 | 0.86 |
| Central and Eastern Steppe Region | 234 | -12 | 4 | -49 | 0.80 |
| Altai Region | 298 | 29 | 1 | 18 | 0.64 |
| Gobi Desert Region | 177 | 1 | 4 | -22 | 0.68 |

# [MOZ] Mozambique

The rain season lasts from November till the end of March, which coincides with the growing period of most of the crops over the country. The monitoring period covers the sowing and growth of Maize, Rice and Wheat. While rainfall increased above average (RAIN 12%), the temperature decreased by about 1.4°C. The solar radiation was average. The agronomic indicators registered increases of 8% (BIOMSS) and 13% (CALF) while maximum VCI reached a high value of 0.96. Overall crop condition is favorable.

The NDVI development graphs indicate that the crop condition was favorable during almost the entire monitoring period. Below the 5 years average condition was verified mostly in the south where the provinces of Gaza, Inhambane and Maputo experienced unfavorable crop condition during almost the entire monitoring period. Crop condition also fell rapidly in late January in northern Tete province. Maximum VCI confirms the generally favorable condition of crops nationwide, mostly in the provinces of Nampula, Zambezia, Sofala and Manica. In the province of Zambezia crop condition was favorable throughout the monitoring period.

Compared to 2018, Mozambique recorded a decrease of both rice yield and area of 2.2%, causing a reduction in expected 2019 production which is estimated at 367 thousand tonnes, a 2.3% drop. Maize yield increased 2.2% and cultivated area fell slightly (0.2%). The total maize output is expected to reach 2125 thousand tons in 2019, up 1.9% over 2018.

## Regional Analysis

According to cropping system, topography and climate, Mozambique was subdivided into 10 agro-ecological zones (AEZ), listed approximately from south to north: (1) Inland of Maputo and Southern Gaza, (2) Coastal areas and South of Rio Save, (3) North and Central Gaza and Western Inhambane, (4) Central medium altitude areas, (5) Low altitude areas of Sofala and Zambezia, (6) Dry areas of Zambezia and Southern Tete, (7) Mid-altitude areas and (8) northern hinterland of Cabo Delgado, (9) High altitude areas and (10) Northern Coastal areas.

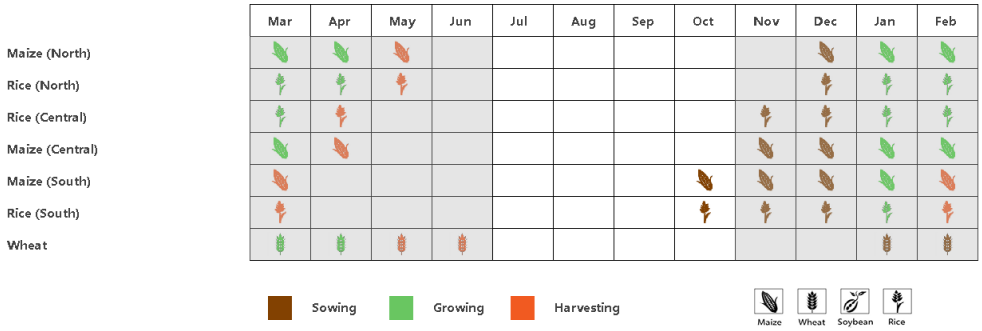
Three regions recorded larger than average precipitation in the range of +10% to +35%: the Low altitude areas of Sofala and Zambezia, Northern Coastal areas and the Northern hinterland of Cabo Delgado. Two regions experienced a marked precipitation deficit, both in the south-west of the country: North and Central Gaza and Western Inhambane (-22%) and Inland of Maputo and Southern Gaza (-26%). The temperature was average or lower than average in all agro-ecological zones with the larges anomalies occurring in two central-western areas along the Zimbabwe border: Dry areas of Zambezia and Southern Tete (-2.3°C) and the Central medium altitude areas (-1.9°C)

As a direct result of the definition of the BIOMSS indicator, the largest BIOMASS anomaly (+ 20%) occurred in Inland of Maputo and Southern Gaza. The largest positive variations in cropped arable land fraction (CALF) where in the Dry areas of Zambezia and Southern Tete (+23%), North and Central Gaza and Western Inhambane (+26%) and in the Northern Coastal areas (+23%).

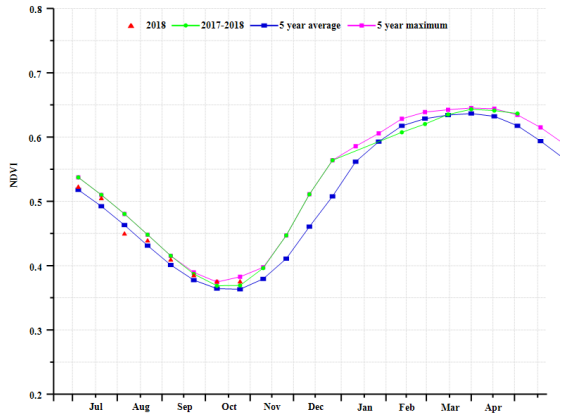
The maximum VCI for the agro-ecological region varied in the range from 0.77 and 1.00 and indicate mostly favorable crop condition. This is confirmed by the NDVI development graphs. The same indicator shows unfavorable condition during part of the reporting period only in the Northern hinterland of Cabo Delgado, Inland of Maputo and Southern Gaza, Coastal areas and South of Save and Northern hinterland of Cabo Delgado.

.

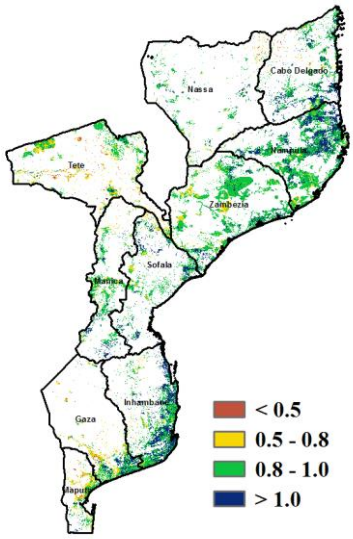
**Figure 3.31. Mozambique's crop condition, October 2018 - January 2019**



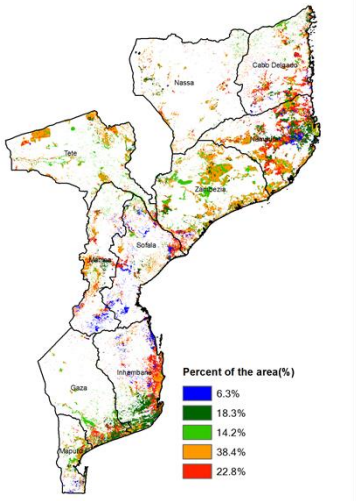

(a). Phenology of major crops



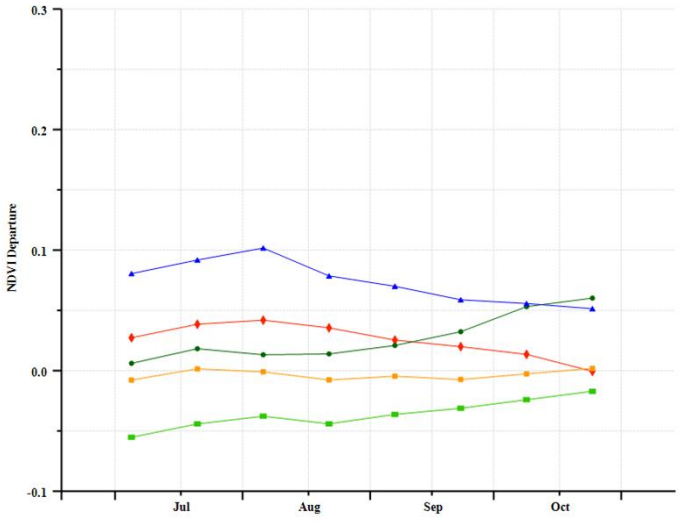

(b) Crop condition development graph based on NDVI



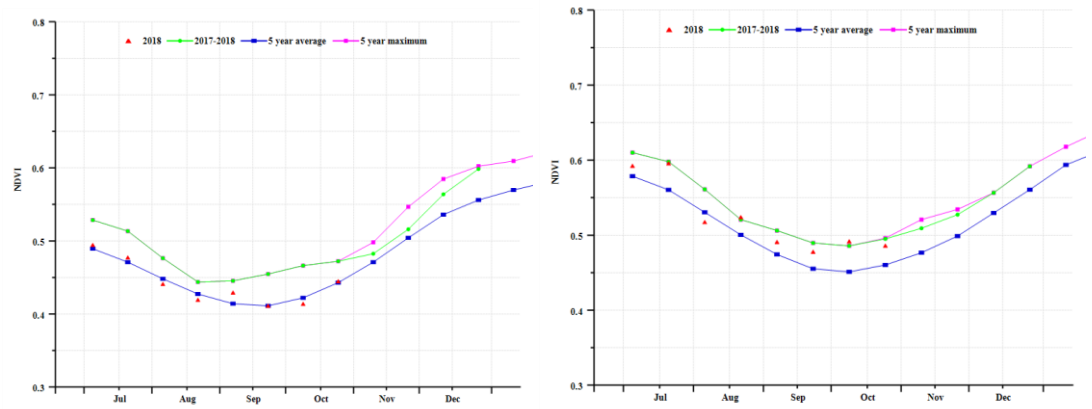

(c) Maximum VCI



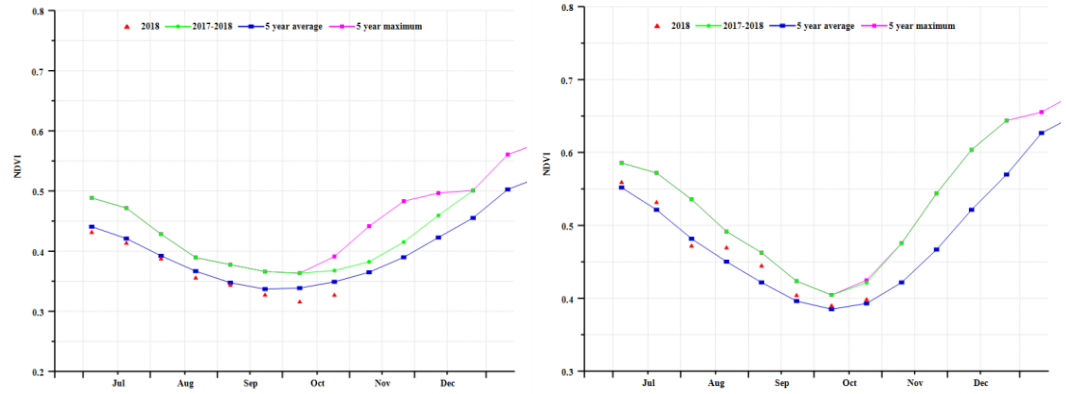

(d) Spatial NDVI patterns compared to 5YA



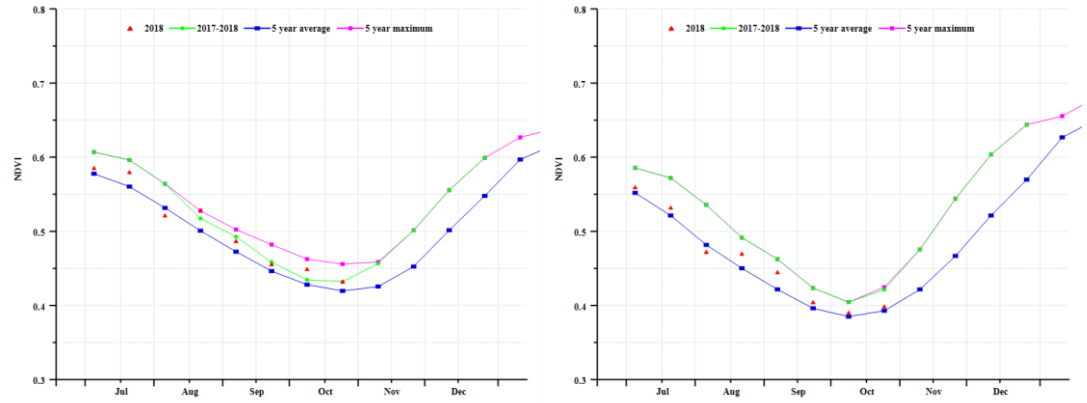

(e) NDVI profiles



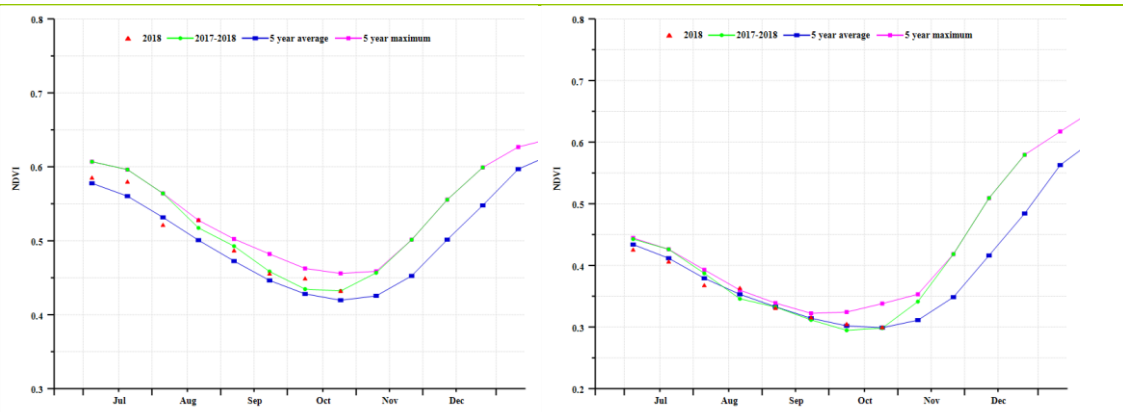

(f) Crop condition development graph based on NDVI (left: Inland of Maputo and Southern Gaza, right: Coastal areas and South of Save)



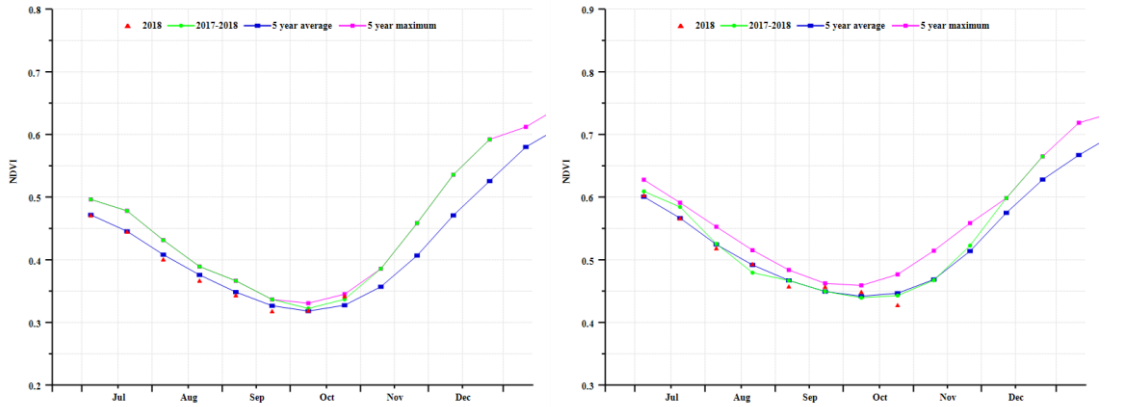

(g) Crop condition development graph based on NDVI (left) North and Central Gaza and Western Inhambane (right) Central medium altitude areas.




(h) Crop condition development graph based on NDVI (left) Low altitude areas of Sofala and Zambezia (right) Dry areas of Zambezia and Southern Tete.




(i) Crop condition development graph based on NDVI (left) Northern coastal areas (right) Mid-altitude areas.




(j) Crop condition development graph based on NDVI (left) High-altitude areas (right) Northern hinterland of Cabo Delgado.

**Table 3.53. Mozambique's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Coastal areas and South of Save** | 429 | 2 | 26.0 | -1.1 | 1354 | 2 |
| **Dry areas of Zambezia and Southern Tete** | **481** | **0** | **27.5** | **-2.3** | **1346** | **-2** |
| **North and Central Gaza and Western Inhambane** | 315 | -22 | 26.3 | -1.0 | 1342 | 7 |
| **High altitude areas** | **694** | **12** | **23.3** | **-1.4** | **1196** | **-4** |
| **Inland of Maputo and Southern Gaza** | 294 | -26 | 25.1 | -1.2 | 1287 | 5 |
| **Low altitude areas of Sofala and Zambezia** | **661** | **32** | **27.2** | **-1.6** | **1346** | **-2** |
| **Central medium altitude areas** | 604 | 0 | 25.7 | -1.9 | 1410 | 2 |
| **Mid-altitude areas** | **694** | **11** | **26.1** | **-1.2** | **1273** | **0** |
| **North Coastal areas** | 613 | 26 | 27.4 | -1.3 | 1352 | 1 |

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
| **Northern hinterland of Cabo Delgado** | **677** | **34** | **25.1** | **-0.9** | **1190** | **3** |

**Table 3.54. Mozambique's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Coastal areas and South of Save** | 1100 | 2 | 98 | 6 | 0.92 |
| **Dry areas of Zambezia and Southern Tete** | 1318 | 7 | 98 | 23 | 0.97 |
| **North and Central Gaza and Western Inhambane** | 962 | -16 | 94 | 26 | 0.84 |
| **High altitude areas** | 1718 | 8 | 100 | 10 | 0.95 |
| **Inland of Maputo and Southern Gaza** | 996 | -18 | 89 | -1 | 0.77 |
| **Low altitude areas of Sofala and Zambezia** | 1353 | 12 | 100 | 6 | 1.00 |
| **Central medium altitude areas** | 1399 | 1 | 100 | 5 | 0.99 |
| **Mid-altitude areas** | 1608 | 11 | 100 | 14 | 0.98 |
| **North Coastal areas** | 1372 | 20 | 99 | 23 | 0.99 |
| **Northern hinterland of Cabo Delgado** | 1589 | 19 | 100 | 3 | 0.95 |

# [NGA] Nigeria

The beginning of the monitoring period covers the harvest of rain-fed rice (in the south) and early maize and drought staples (millet, sorghum) in central and northern locations. The harvest of irrigated rice and late maize occurred up to January.

Agro-climatic indicators show above average rainfall (RAIN +16%) with close to average temperature and sunshine (TEMP +0.3°C, RAPDAR +1%). Compared to the recent 5YA, the potential biomass production increased 13%. The cultivated arable land fraction (CALF) also rose 2% above the 5YA. The maximum vegetation condition index VCIx reached 0.91. In general, NDVI profiles and spatial clusters and other CropWatch show favorable crop condition.

**Regional analysis**

Considering the cropping systems, climatic zones, and topographic conditions, Nigeria is divided into four agro-ecological zones (AEZ). They are referred to (from north to south) as Sudano-Sahelian, Guinean savanna and Derived savanna (the two main maize producing areas) and Humid forest zone.

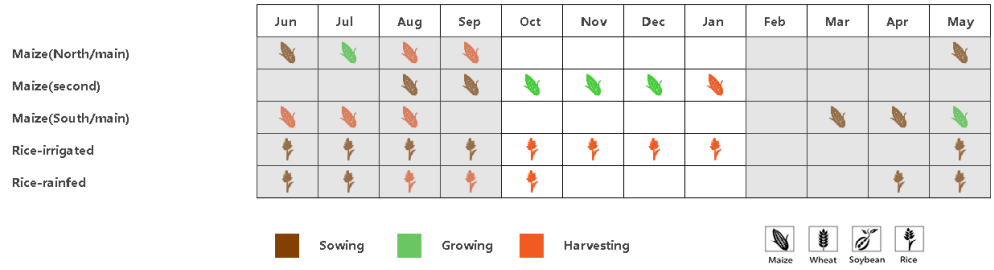
The **Sudano-Sahelian** zone has reached the end of the growing season in September-October and total rainfall was seasonably low (RAIN 61 mm) but nevertheless significantly above average (+59%). The temperature departure was negative by -0.6°C. RADPAR has remained constant and the BIOMSS index increased 45% above average. The arable land fraction (CALF) rose 9% above the recent five-year average. The maximum VCIx reached 0.88. The NDVI development graph shows above average crop condition. The unseasonable late rain has benefited range-lands and irrigated wheat.

The **Guinean Savanna** recorded an NDVI profile almost identical to the average of the previous five years. Rainfall was above average (RAIN +27%) and temperature was average (TEMP -0.3°C), resulting in high total biomass production potential (BIOMASS +19%). Sunshine was average as well (RADPAR +1%) and CALF remained constant. With VCIx at 0.92, crop condition is assessed as fair.

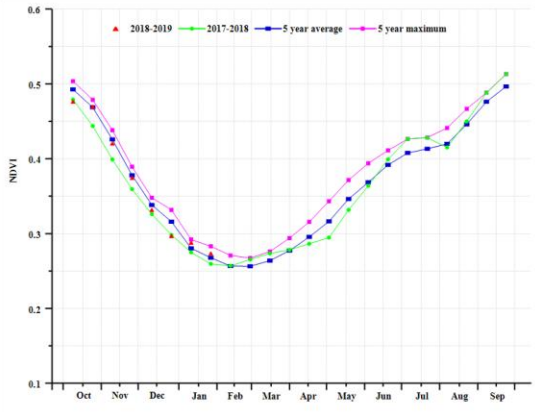
The **Derived savanna** region had mostly above-average agro-climatic indicators: RAIN (271 mm) was up 13% compared to average; RADPAR and BIOMSS increased by 2% and 8%, respectively. Temperature was average (TEMP -0.1°C). The NDVI development graph of this zone shows that from October to Mid-November crop condition was above-average; it was below average from mid- November to December. Irrigated rice is unlikely to have suffered but maize and other crops may have been affected. Altogether, however, with CALF reaching the very high value of 99% (indicating that virtually all land was cultivated) and the maximum VCI value of 0.94 CropWatch assesses the situation as favorable.

The **humid forest zone** is the wettest part of Nigeria, with growing seasons that may reach 365 days in the south. At 528 mm, rainfall was above average (RAIN +12%), and so were sunshine (RAPDAR 3%) and the biomass accumulation potential (BIOMASS +5%). Temperature was somewhat cooler than usual (TEMP -0.4°) and CALF remained constant at the high value of 99%. NDVI curves (both the AEZ average and the spatial profiles) show some fluctuations, including negative values in early October. They may result from very large excess precipitation and floods during the previous reporting period. Maximum VCI was nevertheless fair and CALF was high, which stands for satisfactory crops.

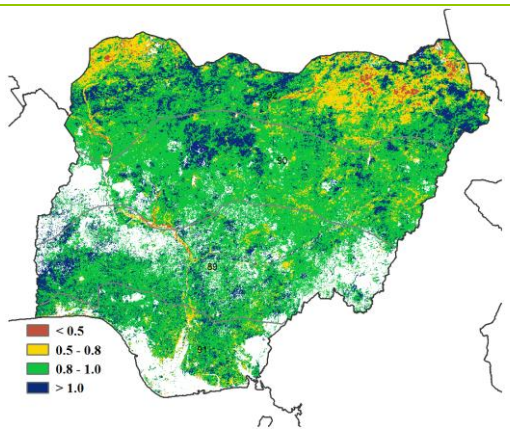
**Figure 3.32. Nigeria's crop condition, July -October 2018**



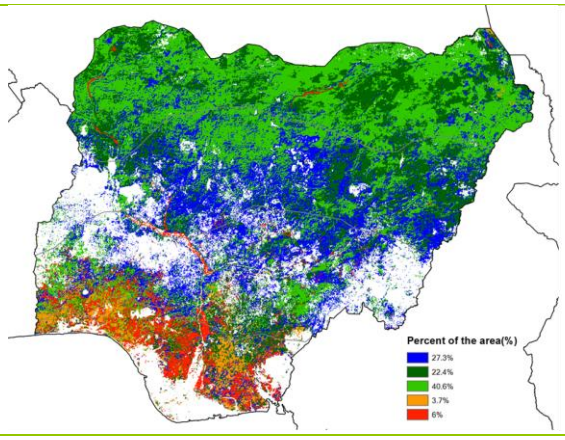

(a) Phenology of major crops



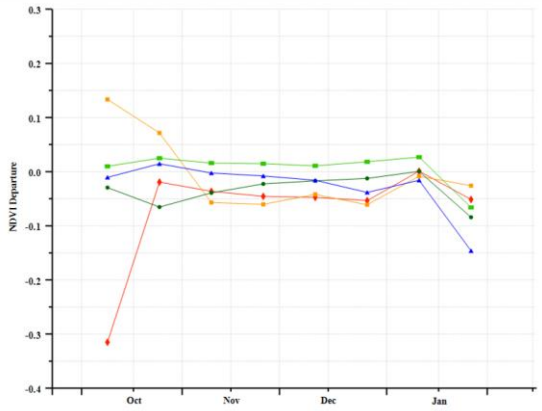

(b) Crop condition development graph based on NDVI



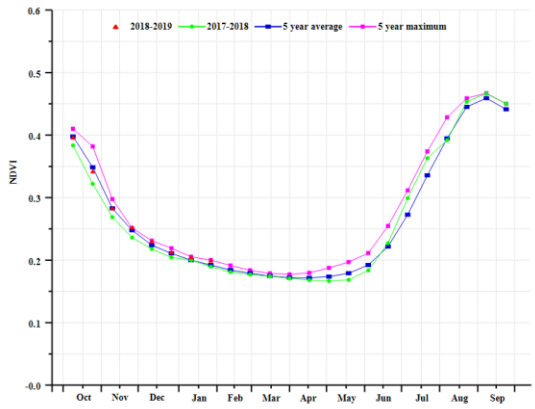

(c) Maximum VCI

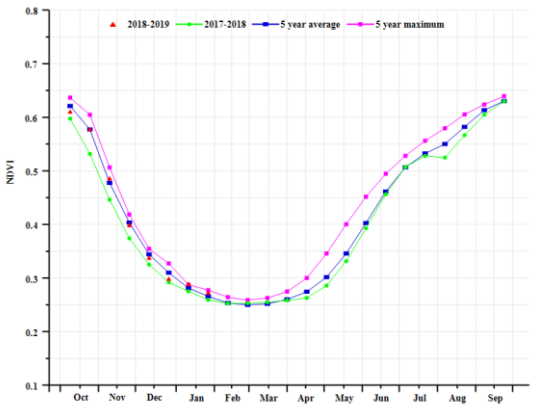



(d) Spatial NDVI patterns compared to 5YA

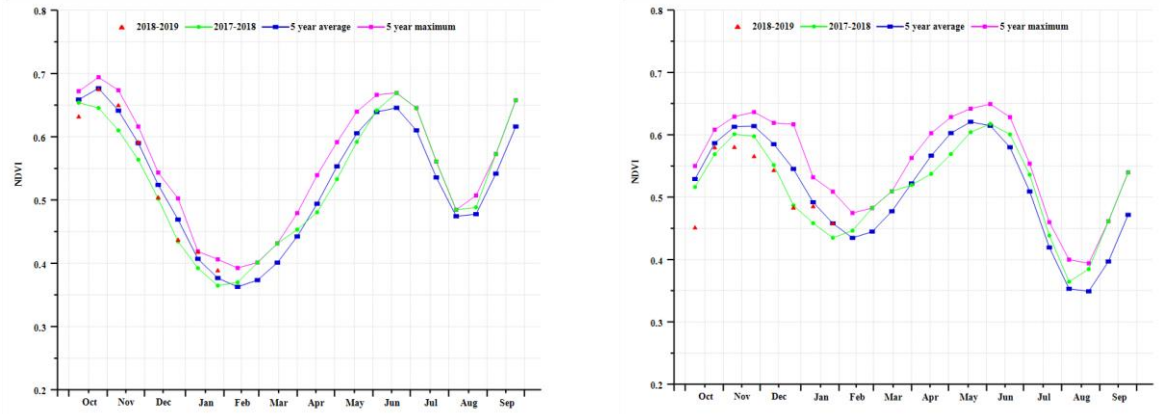



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Soudano-Sahelian zone (left) and Guinean savanna (right))




(g) Crop condition development graph based on NDVI (Derived savanna zone (left) and Humid forest zone (right))

**Table 3.55. Nigeria's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018-January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Soudano-Sahelian zone | 61 | 59 | 26.4 | -0.6 | 1260 | 0 |
| Guinean savanna | 117 | 27 | 26.3 | -0.3 | 1304 | 1 |
| Derived savanna zone | 273 | 13 | 27.4 | -0.1 | 1262 | 2 |
| Humid forest zone | 528 | 12 | 27.6 | -0.4 | 1198 | 3 |

**Table 3.56. Nigeria's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018-January 2019**

| Region | BIOMASS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Soudano-Sahelian zone | 200 | 45 | 59 | 9 | 0.88 |
| Guinean savanna | 354 | 19 | 98 | 0 | 0.92 |
| Derived savanna zone | 684 | 8 | 99 | 0 | 0.94 |
| Humid forest zone | 1219 | 5 | 99 | 0 | 0.92 |

# [PAK] Pakistan

This monitoring period covers the maturity and harvest of summer maize and rice, and the sowing and early growth of winter wheat. Crop condition was generally favorable from October to January. Compared with average, RAIN was 35% above, while TEMP and RADPAR showed decreases (-0.5°C and -2% respectively). The combination of all the agro-climatic indicators resulted in BIOMSS exceeding the recent five-year average by 27%. The national average of VCIx (0.72) was just fair but the fraction of cropped arable land (CALF) increased by a very significant 19%.

Crops condition was close to average in January, as shown by the NDVI development graph at the national level. According to the spatial NDVI patterns and profiles, close to 24% of the cropped areas were below average throughout the period, essentially in the South and north-eastern areas. Punjab and the Indus river basin, two major wheat producing areas present above average NDVI. Considering that weather, in particular rainfall, has been favorable so far, winter wheat prospects are promising.

**Regional analysis**

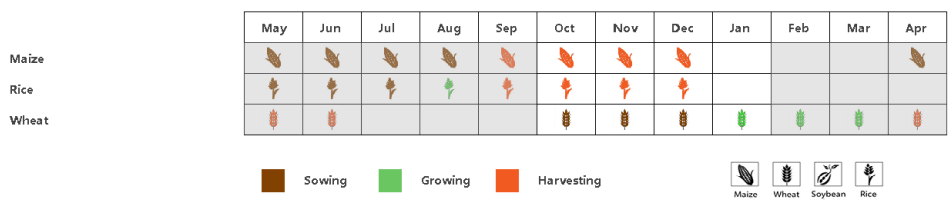
For a more detailed spatial analysis, CropWatch subdivides Pakistan into three agro-ecological regions based essentially on geography and agro-climatic conditions: the Northern highlands, Northern Punjab region and the Lower Indus river basin in south Punjab and Sind.

RAIN in the Northern highland region was 36% above average. RADPAR and TEMP were low compared to average (-4% and -0.7°C respectively). Accordingly, BIOMSS was 22% above average. The region achieved a low CALF of 41%. The NDVI development graph shows below average crop condition in January, especially in the north. This is, however, still early in the growing season and the final outcome of winter crops will depend on soil moisture later in the season.

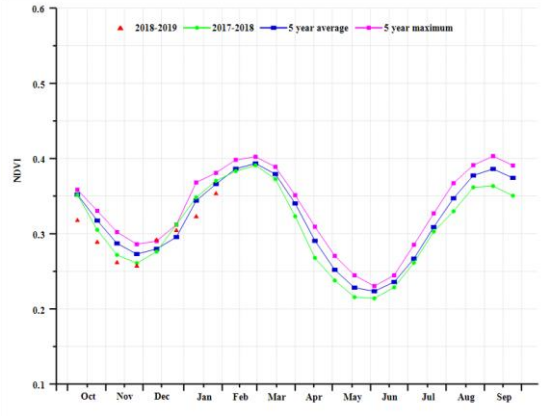
Northern Punjab, the main agricultural region in Pakistan recorded the highest RAIN (+58% above average). TEMP was below average by 0.9°C (which is significant), and the RADPAR departure was -3%. The resulting BIOMSS exceeded the recent five-year average by 48%. The area had a good CALF of 82% (16% above 2018) and a VCIx of 0.90. However, crop condition assessed through NDVI shows low values which could be due to delayed sowing resulting from low temperature or excessive rainfall. Overall, the crop production potential for the region is deemed to be neutral for the time being.

In the Lower Indus river basin in south Punjab and Sind, RAIN was significantly above average (by 48%), while TEMP was below average of 0.3°C and RADPAR was average to the extent that the estimated BIOMSS departure of 66% compared to the five-year average is probably optimistic, even considering that the vast majority of crops is irrigated. January crop condition based on NDVI was below average, but the low CALF (67%) is nevertheless a large increase over the recent 5YA (+22%); VCIx at 0.84 indicates favorable crop condition. Overall, prospects remain favorable for the region.

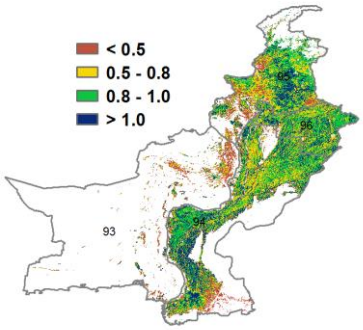
**Figure 3.33. Pakistan's crop condition, October 2018- January 2019**



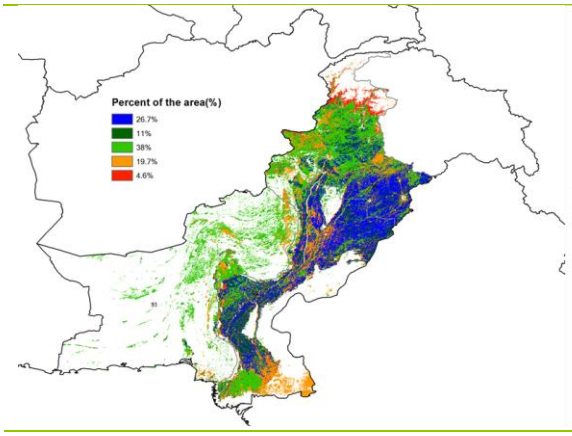

(a). Phenology of major crops



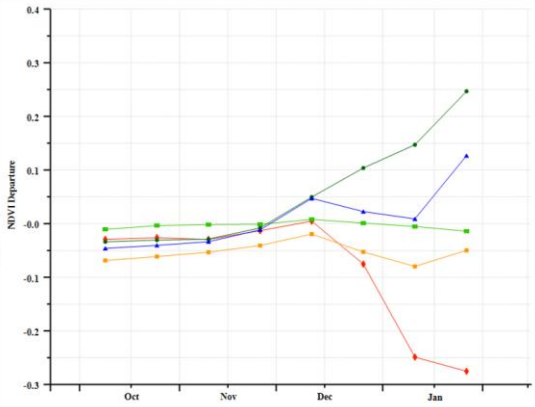

(b) Crop condition development graph based on NDVI



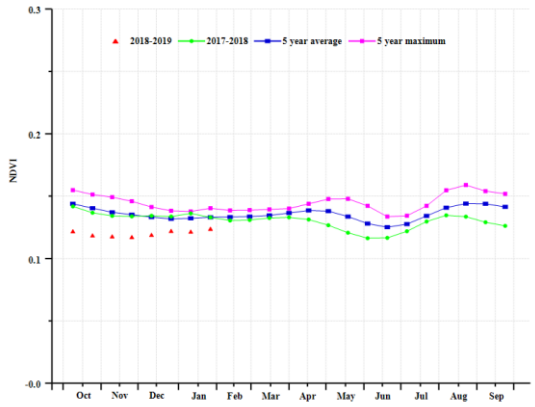

(c) Maximum VCI

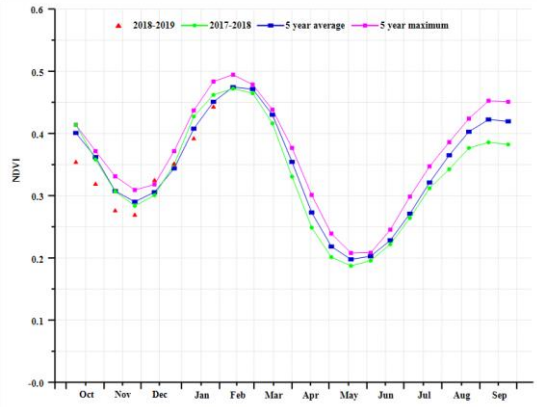



(d) Spatial NDVI patterns compared to 5YA

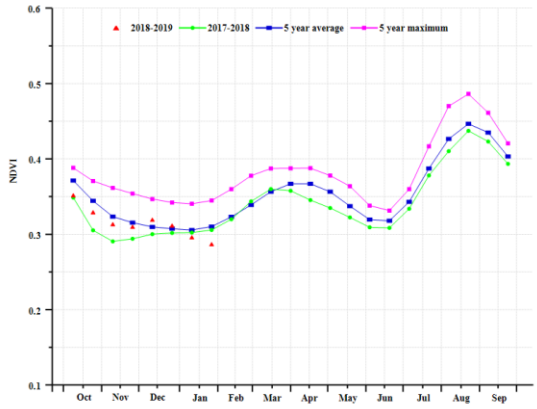


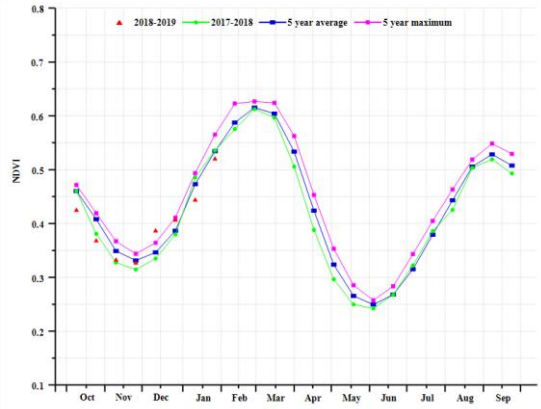

(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Balochistan Non-agricultural Region (left) Lower Indus river basin in south Punjab and Sind (right))



(g) Crop condition development graph based on NDVI (Northern Highlands (left) Northern Punjab (right))

**Table 3.57. Pakistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018-January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| **Balochistan** | 47 | 5 | 14.6 | -0.1 | 982 | 1.0 |
| **Lower Indus river basin in south Punjab and Sind** | 28 | 48 | 20.2 | -0.3 | 966 | 0 |
| **Northern highlands** | 164 | 36 | 9.5 | -0.7 | 774 | -4 |
| **Northern Punjab** | 87 | 58 | 16.7 | -0.9 | 815 | -3 |

**Table 3.58. Pakistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018-January 2019**

| Region | BIOMSS | | CALF | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current (%) | Departure from 5YA (%) | Current |
| **Balochistan** | 168 | 8 | - | - | 0.22 |
| **Lower Indus river basin in south Punjab and Sind** | 129 | 66 | 67 | 22 | 0.84 |
| **Northern highlands** | 476 | 22 | 41 | 17 | 0.78 |
| **Northern Punjab** | 346 | 48 | 82 | 16 | 0.90 |

# [PHL] The Philippines

In the Philippines, the monitoring period covers the harvesting stage of last year's main rice, as well as the sowing stage of secondary rice and maize. According to the NDVI profiles for the country, crops generally showed unfavorable condition. Nationwide, precipitation (RAIN) presents a negative departure of 25% compared with average, accompanied by above average radiation (+7%) and slightly below average temperature (-0.2°C). The rainfall deficit resulted in BIOMSS being 18% below average.

However, according to the VCIx indicator, which mostly exceeded 0.80, favorable crop condition prevailed. The cropped arable land fraction (CALF) nation-wide was almost 100%. Considering the spatial patterns of NDVI profiles, 100% of the cropped area experienced average conditions from October to November. Later in the season, however, from December to January four different patterns emerged, （1）29.4% of the cropped area experienced slightly below average condition, from Mindanao to Mindoro; （2）45.3% of the cropped area experienced slightly above average conditions, mostly in the Center and the North, from Negros and Cebu to Luzon; (3) a marked drop in December and a recovery to average condition in January in 13.5% of the cropped areas in patches of Mindanao and Luzon; (4) a marked drop in January in 11.9% of the cropped areas, affecting essentially Samar, Leyte, and about one third of Mindanao. The behavior of NDVI can be explained at least partially by several typhoons that affected the Philippines, such as Pabuk in late December (refer to the section on disasters). Altogether, the outputs for secondary maize and rice in the country are expected to be below average.

**Regional analysis**

Based on cropping systems, climatic zones and topographic conditions, three main agro-ecological regions can be distinguished for the Philippines. They are the Lowlands region (northern islands), the Hills region (Islands of Bohol, Sebu and Negros), and the Forest region (mostly southern and western islands).

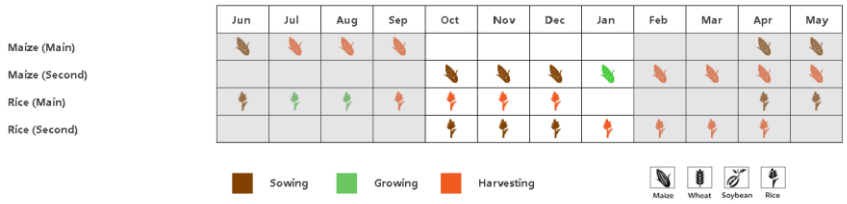
The **Lowlands region** experienced a rainfall deficit (RAIN -27%), slightly low temperature (TEMP -0.1°C), and well above average radiation (RADPAR +13%). According to the NDVI profiles for the region, crop condition was below the five-year average. BIOMSS was down 25% compared to the average. Altogether, the outputs for secondary maize and rice are expected to be below average.

The **Hilly region** experienced a rainfall deficit (RAIN -27%), average temperature (TEMP +0.1°C), and above average radiation (RADPAR +5%). According to the NDVI profiles for the region, crop condition was below the five-year average from mid-November in 2018 to January in 2019. BIOMSS was down 10% below average. Altogether, the output for secondary maize and rice are expected to be below average as well.

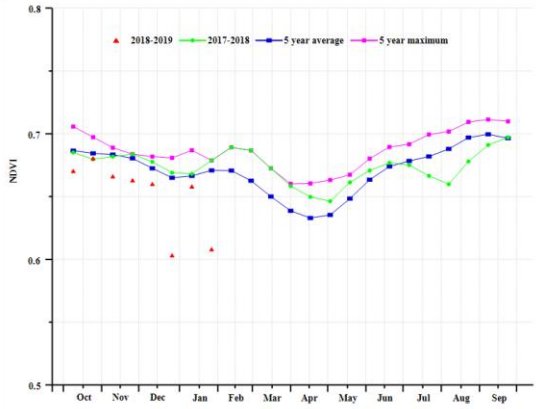
The **Forest region** experienced a rainfall deficit (RAIN -23%), average temperature (TEMP -0.3°C), and above average radiation (RADPAR +2%). According to the NDVI profiles for the region, crop condition was below the five-year average. BIOMSS was down 13% from average. Altogether, the output of secondary maize and rice are expected to be below average as well.

The NDVI-based Crop condition development graphs indicate below average conditions over the monitoring period. Crop prospects are generally below average due to rainfall deficits and cyclone impacts.

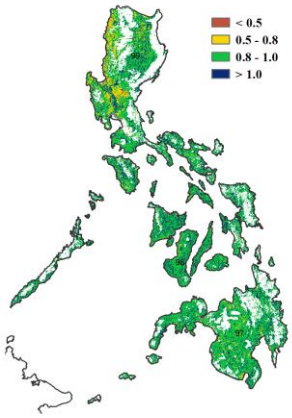
**Figure 3.34. Philippines's crop condition, October 2018 -January 2019**



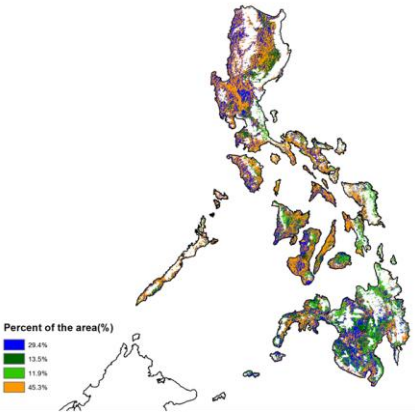

(a). Phenology of major crops



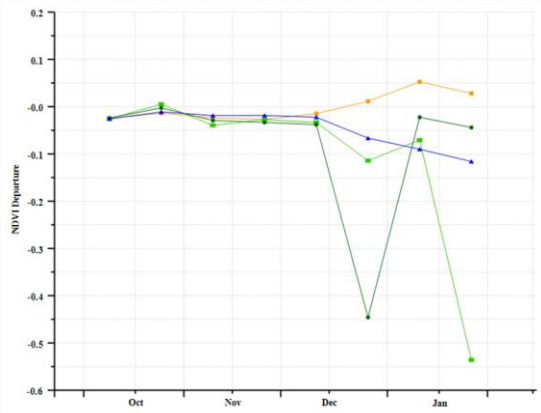

(b) Crop condition development graph based on NDVI



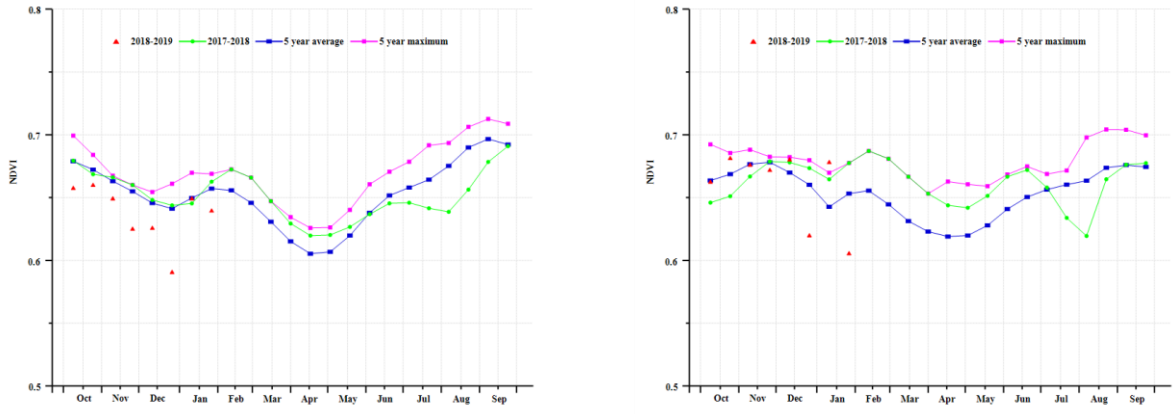

(c) Maximum VCI



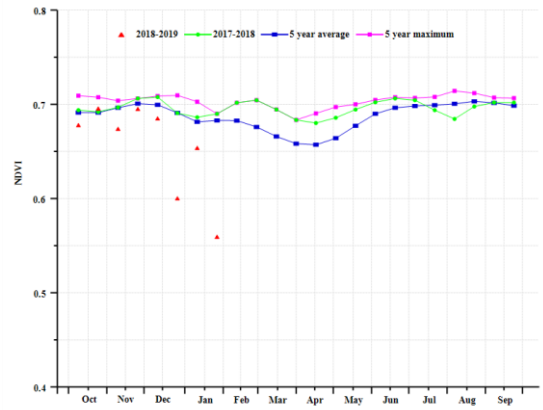

(d) Spatial NDVI patterns compared to 5YA




(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Lowland region (left) and Hilly region (right))




(g) Crop condition development graph based on NDVI (Forest region)

**Table 3.59. Philippines's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 -January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Lowlands region | 594 | -27 | 25.2 | -0.1 | 1037 | 13 |
| Hills region | 593 | -27 | 26.4 | 0.1 | 1159 | 5 |
| Forest region | 933 | -23 | 25.8 | -0.3 | 1090 | 2 |

**Table 3.60. Philippines's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 -January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Lowlands region | 1109 | -25 | 100 | 0 | 0.93 |
| Hills region | 1594 | -10 | 100 | 1 | 0.97 |
| Forest region | 1742 | -13 | 100 | 0 | 0.96 |

# [POL] Poland

The monitoring period covers the harvest of late summer crops such as maize (October), and the sowing of the next winter wheat (in September and October). The Cropped Arable Land Fraction (CALF) was high and close to average. Weather conditions were average, just slightly drier and warmer (RAIN -1%, TEMP + 0.6°C), but much more sunny (RADPAR was above the average by 8%). This led to increased potential biomass (BIOMSS +6%). Due to the favorable condition, VCIx in Poland during the reporting period was high at 0.92.

As shown by the crop condition development graph, national NDVI values fell markedly due to snow in late December. Nearly all of the agriculture areas had below average NDVI at that time. This has not affected crop condition, which is currently assessed as favorable.

**Regional analysis**

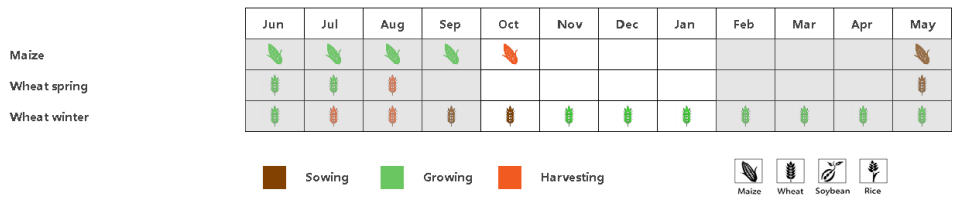
Four agro-ecological zones (AEZ) are examined more closely below. They include the Northern oats and potatoes areas (the northern half of: west Pomerania, eastern Pomerania and Warmia-Masuria), the Northern-central wheat and sugar-beet area (Kuyavia-Pomerania to the Baltic sea), the Central rye and potatoes area (Lubusz to South Podlaskie and northern Lublin), and the Southern wheat and sugar-beet area from southern Lower Silesia to southern Lublin and Subcarpathia along the Czech and Slovak borders. The listed administrative units correspond to vovoidships.

The **Northern oats and potatoes area** and the **Northern-central wheat and sugar-beet area** recorded both drier and warmer conditions compared to the average (RAIN -11% and -9%, TEMP +0.6°C for both AEZs). RADPAR was above average in the two areas (+13% and +12%, respectively). Due to the favorable condition, BIOMSS increased 5% and 6%, respectively. The areas also had high CALF (100% and 99%) and favorable VCIx (0.94 and 0.91). Crop condition is at least satisfactory.

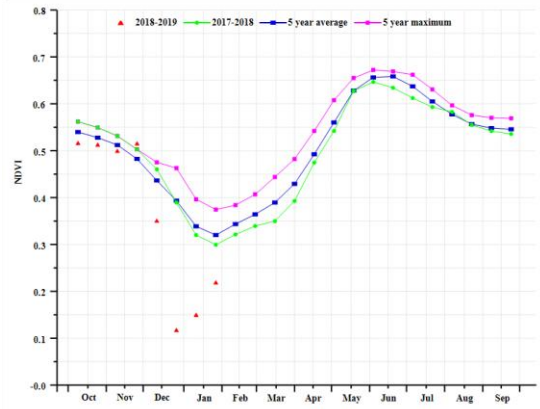
Weather closer to average for precipitation and sunnier prevailed in the **Central rye and potatoes area**: RAIN -1%, TEMP +0.6°C and RADPAR +9%, which accounts for the increase of biomass (BIOMSS +6%) compared to the five-year average. CALF and VCIx in the area were both favorable (CALF 100%, VCIx 0.91). Crop condition is good.

The Southern **wheat and sugar-beet area** was wetter and warmer than average (RAIN +8%, TEMP +0.5°C), but less sunny than the center and the north of the country (RADPAR +5%). The increased biomass (BIOMSS +7%) resulted from the favorable condition. The area had a high CALF (100%) as well as a favorable VCIx (0.92).

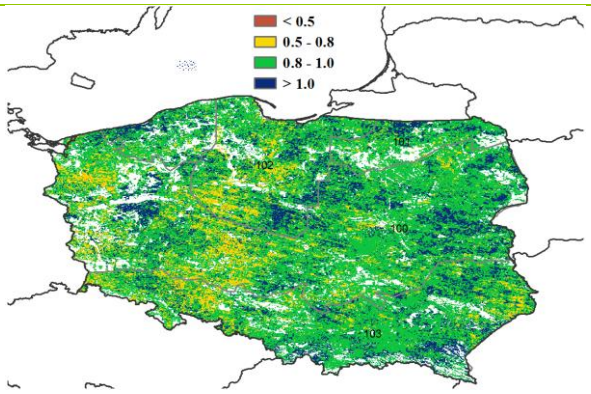
**Figure 3.35. Poland's crop condition, October 2018-January 2019**



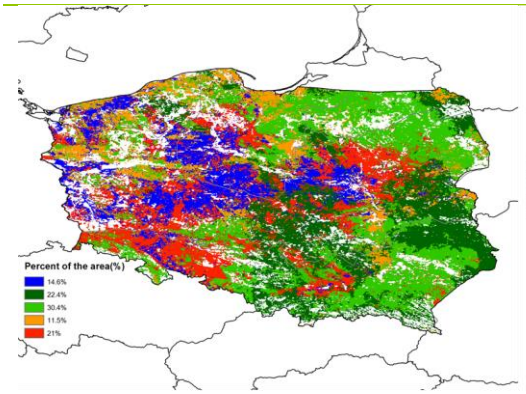

(a). Phenology of major crops



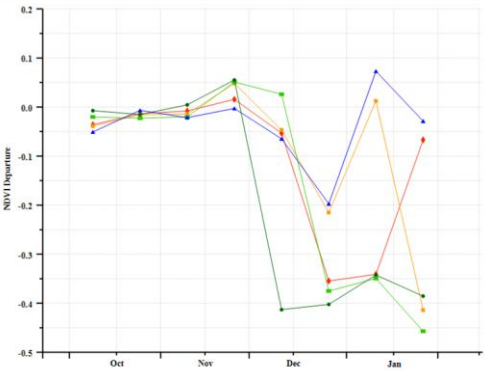

(b) Crop condition development graph based on NDVI



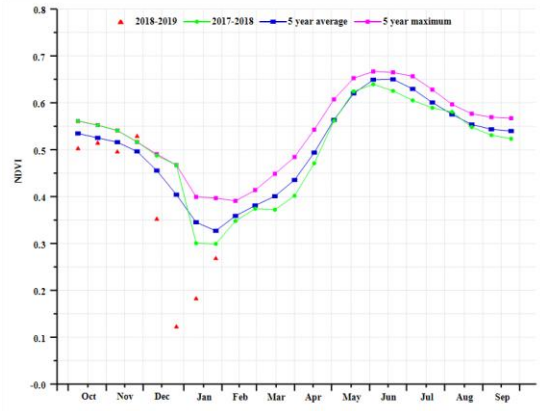

(c) Maximum VCI

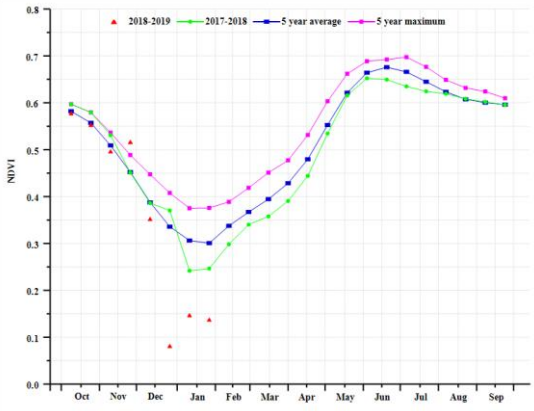



(d) Spatial NDVI patterns compared to 5YA

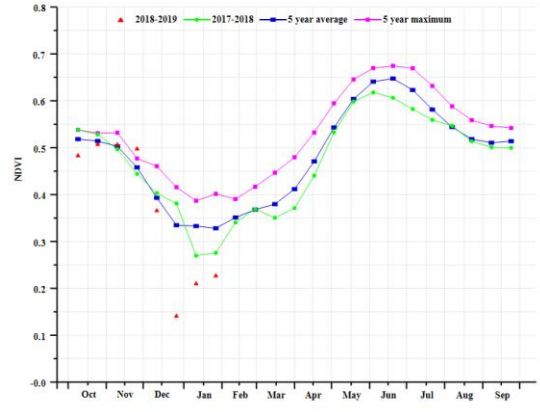


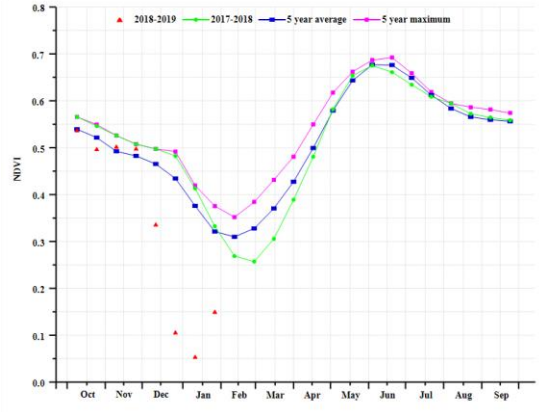

(e) NDVI profiles




(f) Crop condition development graph based on NDVI, Central rye and potatoes area (left) and Northern oats and potatoes area (right).




(g) Crop condition development graph based on NDVI, Northern-central wheat and sugar beet area (left) and Southern wheat and sugar beet area (right).

**Table 3.61. Poland's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018- January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Central rye and potatoes area | 270 | -1 | 3.8 | 0.6 | 214 | 9 |
| Northern oats and potatoes areas | 285 | -11 | 3.5 | 0.6 | 189 | 13 |
| Northern-central wheat and sugarbeet area | 256 | -9 | 3.9 | 0.6 | 202 | 12 |
| Southern wheat and sugarbeet area | 275 | 8 | 3.5 | 0.5 | 264 | 5 |

**Table 3.62. Poland's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018- January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/$m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Central rye and potatoes area | 928 | 6 | 100 | 0 | 0.91 |
| Northern oats and potatoes areas | 906 | 5 | 100 | 0 | 0.94 |
| Northern-central wheat and sugarbeet area | 938 | 6 | 99 | 0 | 0.91 |
| Southern wheat and sugarbeet area | 906 | 7 | 100 | 1 | 0.92 |

# [ROU] Romania

Maize was harvested during the reporting period and winter wheat began vegetative growth after being sown from November. The overall condition of winter wheat was fair at best (VCIx = 0.64). Both rainfall and temperature were higher than average (RAIN +35% and TEMP +0.2°C, a minor anomaly). Sunshine as assessed by RADPAR was just 1% above the reference. Biomass showed better condition than average (BIOMSS +19%) while CALF was lower than average (CALF -35%). The low CALF in this region was correlated with low VCIx values and the NDVI profile showed that crop condition in Romania was lower than average. Spatial NDVI profiles show a diversity of patters. In the Western and central maize, wheat and sugar beet plateau NDVI first increased in November and decreased in December while in the Eastern and southern maize, wheat and sugar beet plains NDVI had a drop in November but recovered later in the season.

**Regional analysis**

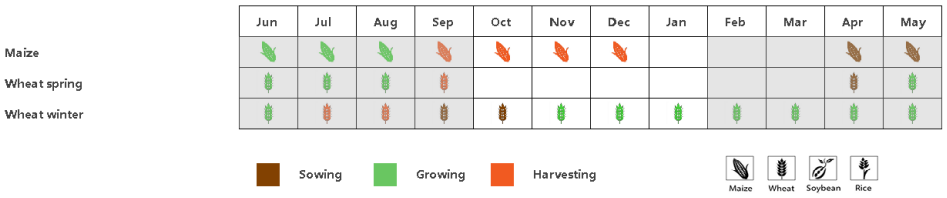
More detail is provided below for three main agro-ecological zones (AEZ) of the country. They include the the Eastern and southern maize, wheat and sugar beet plains (105), the Central mixed farming and pasture Carpathian hills (104) and the Western and central maize, wheat and sugar beet plateau (106).

All AEZs enjoyed an increase of rain over average while temperature and solar radiation were about average. VCIx in all three regions was low. VCIx was lower than 0.5 in most regions of the Eastern and southern plain, somewhat better (at 0.5-0.8) in the Central mixed farming and pasture Carpathian hills. Few regions in Romania have a VCIx exceeding 1.0.

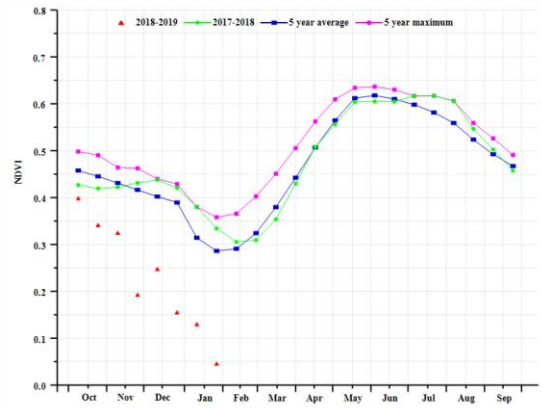
According to NDVI development profile, crop condition was below average in the three regions. In the **Central mixed farming and pasture Carpathian hills** and the **Western and central maize, wheat and sugar beet plateau**, crop condition was near the average during October and November then deteriorated in December. Crop conditions in the **Eastern and southern maize**, **wheat and sugar beet plains** were below average at the beginning of the monitoring period. As for cultivated areas, a decrease of CALF occurred in all three regions compared with average. In the **Eastern and southern maize**, **wheat and sugar beet plains**, CALF fell more than 40% below the 5YA. The CALF of **Western and central maize, wheat and sugar beet plateau** decreased around 20% and the **Eastern and southern maize, wheat and sugar beet plains** decreased 7%. The CALF decrease should be noted as this may influence the final outcome of the season.

Overall the expectations for winter crops output in Romania are unfavorable.

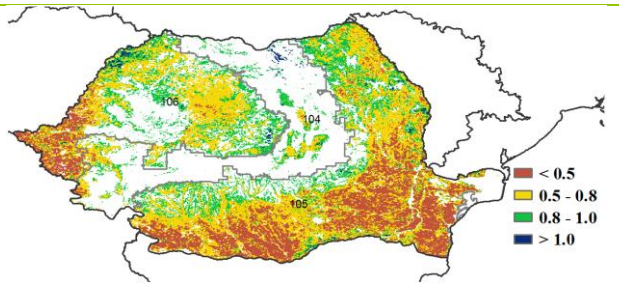
**Figure 3.36. Romania's crop condition, July - October 2018**



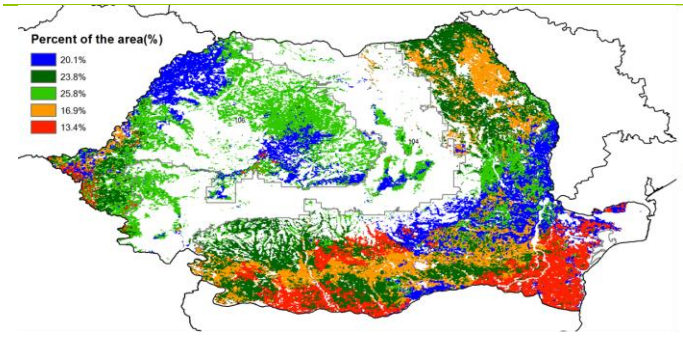

(a). Phenology of major crops



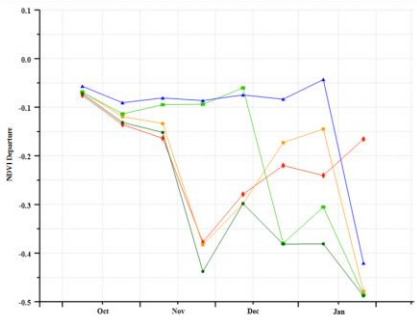

(b) Crop condition development graph based on NDVI



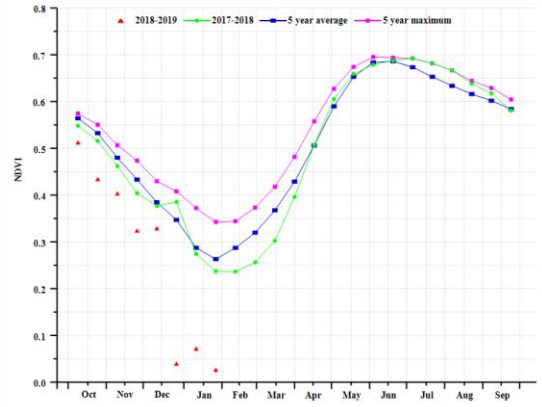

(c) Maximum VCI

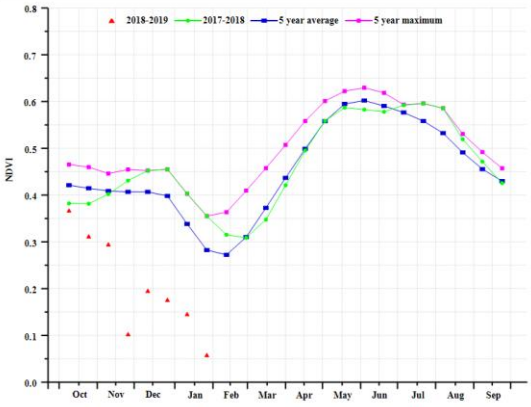



(d) Spatial NDVI patterns compared to 5YA

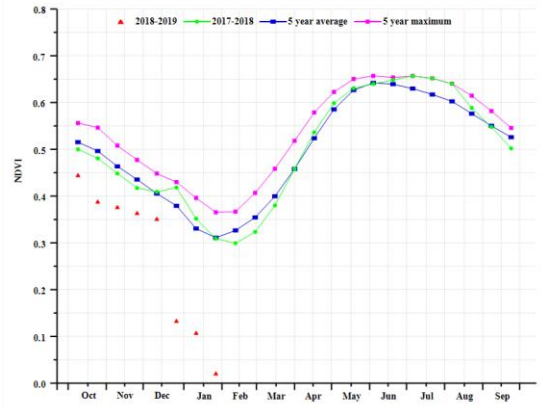



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Central mixed farming and pasture Carpathian hills (left) and Eastern and southern maize, wheat and sugarbeet plains (right))




(g) Crop condition development graph based on NDVI (Western and central maize, wheat and sugar beet plateau)

**Table 3.63. Romania's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018-January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Central mixed farming and pasture Carpathian hills | 313 | 22 | 1.5 | 0.5 | 380 | 3 |
| Eastern and southern maize, wheat and sugar beet plains | 290 | 43 | 3.9 | -0.4 | 388 | 0 |
| Western and central maize, wheat and sugar beet plateau | 325 | 33 | 3.8 | 1.0 | 375 | 2 |

**Table 3.64. Romania's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018-January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Central mixed farming and pasture Carpathian hills | 796 | 11 | 90 | -7 | 0.80 |
| Eastern and southern maize, wheat and sugar beet plains | 916 | 21 | 45 | -46 | 0.60 |
| Western and central maize, wheat and sugar beet plateau | 937 | 20 | 77 | -19 | 0.70 |

# [RUS] Russia

Crop phenology is complex in Russia due the large diversity of climatic conditions. Generally, winter wheat is harvested from mid to late summer and planted from August onwards, locally as late as October. Summer crops, especially maize, are harvested up to October or sometimes up to mid-November, well after physiological maturity.

Cropped arable land fraction (CALF) increased by 8% over the average of the previous five years but the nationwide average remains rather low at 63%. The value of VCIx in the country was 0.79, a moderate value which may result from relatively dry and sunny weather (RAIN -10%, RADPAR +5%). Both temperature and the biomass production potential were average.

NDVI development graphs for the country indicate close average to crop condition from October to early November. From late November to early January snow depressed NDVI values which, however, returned to just below average values at the end of the month.

NDVI was above average from October to November and then below average in about 24.4% of arable area of Russia, mainly in central Russia, Central black earth, Caucasus and middle Volga regions. In other 20.3% areas, including many areas of middle and west Siberia, NDVI was above average only from late October to early November. In most area of east Siberia, some areas of west Siberia and southern Caucasus (making up about 25.3% of crop land) NDVI was above average only in late October. In the other 30% areas of Russia, NDVI was below average during the whole period.

Compared to the previous five years, crop condition was globally close to average.

**Regional analysis**

A more detailed analysis is provided for twelve agro-ecological zones (AEZ), namely the Amur and Primorsky Krai area (110), Central Russia (107), Central Black Earth region (108), East Siberia (109), Middle Siberia (112), Middle Volga (111), Northwest Region including Novgorod (198), Northern Caucasus (202), Southern Caucasus (114), Ural sand west Volga-Vyatka (200), Western Siberia (113) and West subarctic region (199).

In **Amur and Primorsky Krai, Middle Siberian and East Siberian regions**, biomass expectations were above average by 27%, 12% and 19% respectively due to increased temperature (+2.5°C, +1.3°C, +2.4°C), in spite of decreased rainfall in middle Siberia (-9%) and east Siberia (-2%). RADPAR was close to average in the three regions. The cropped arable land fraction in east Siberia was 89% (decreased by 3%), and VCIx was 0.81. VCIx was 0.85 in the other two regions where CALF increased by 4% and 27% respectively, but values were not very high, especially in Amur and Primorsky Krai (only 33%).

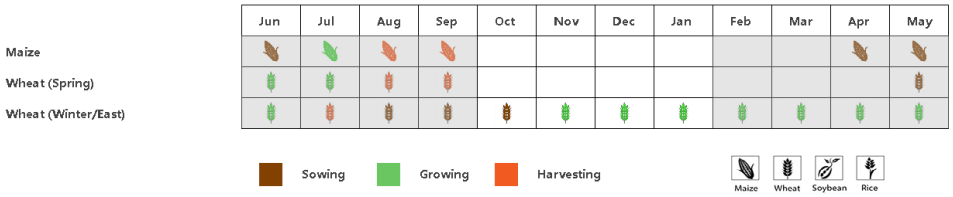
Compared to last 15 years, rainfall and temperature were all below average in **Central Russia** (-27%, -2.4°C), **Central black earth** (-22%, -1.0°C) **and Northwest Region including Novgorod regions** (-21%, -0.1°C), leading to decreased biomass by 6%, 8% and 2% respectively. CALF values were high (99% and 100%, respectively) in Central Russia and Northwest Region where VCIx reached 0.95 and 0.89. In the Central black earth AEZ, CALF was only 75% and VCIx was 0.82.

In the **Southern Caucasus** and **Northern Caucasus regions**, rainfall was up 9% and 38% respectively resulting in above biomass (+8%, +9%). CALF was low (48% and 50%, respectively) and VCIx reached 0.74 and 0.75, respectively.

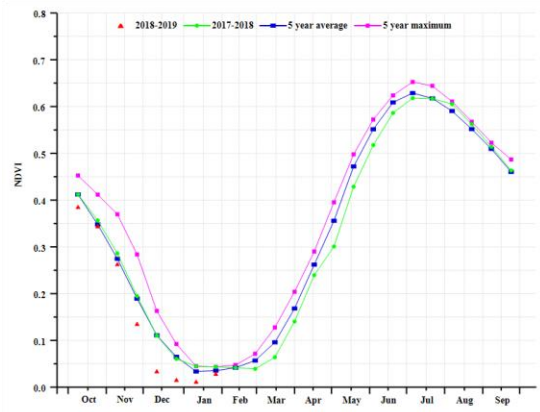
Cropped arable land fraction was between 61% to 65% in **Middle Volga, Ural and west Volga-Vyatka**, and **West Siberian regions**. Due to decreased rainfall (-16% compared to average for middle Volga, -8% for Ural and west Volga-Vyatka) and temperature (-0.6°C in middle Volga and -0.2°C in west Siberian), biomass were all below the average of last 5 years.

In the **West subarctic region**, cropped arable land fraction increased by 6% to 98%, with a high VCIx value 0.90. Biomass was below average of last 5 years by 2% due to the reduced rainfall (-12%).

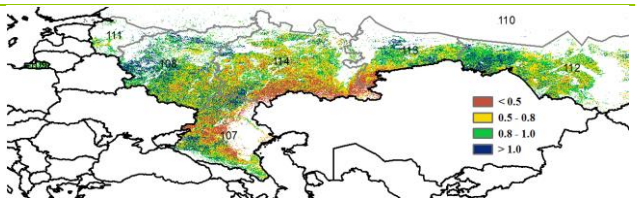
**Figure 3.37. Russia's crop condition, July - October 2018**



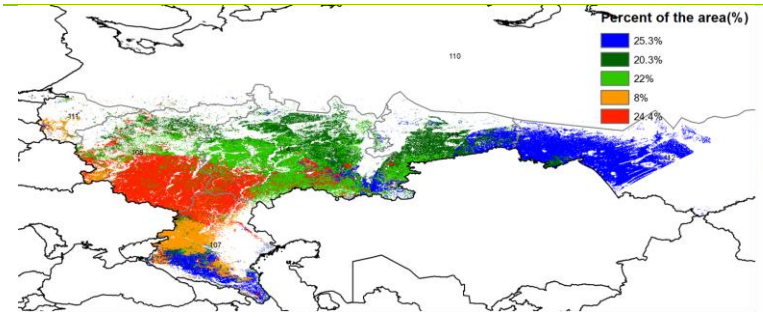

(a). Phenology of major crops



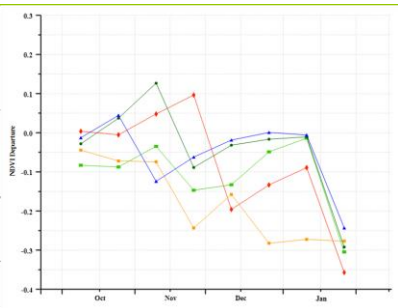

(b) Crop condition development graph based on NDVI



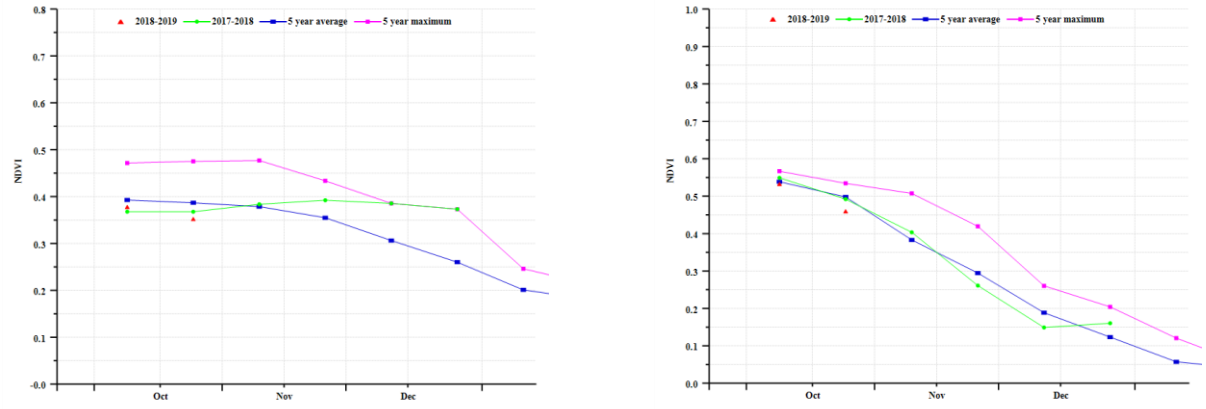

(c) Maximum VCI



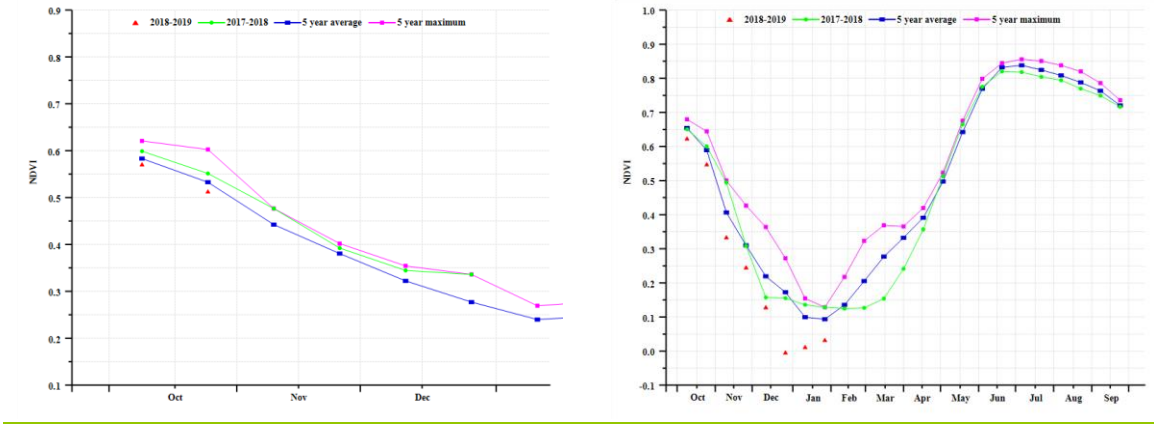

(d) Spatial NDVI patterns compared to 5YA



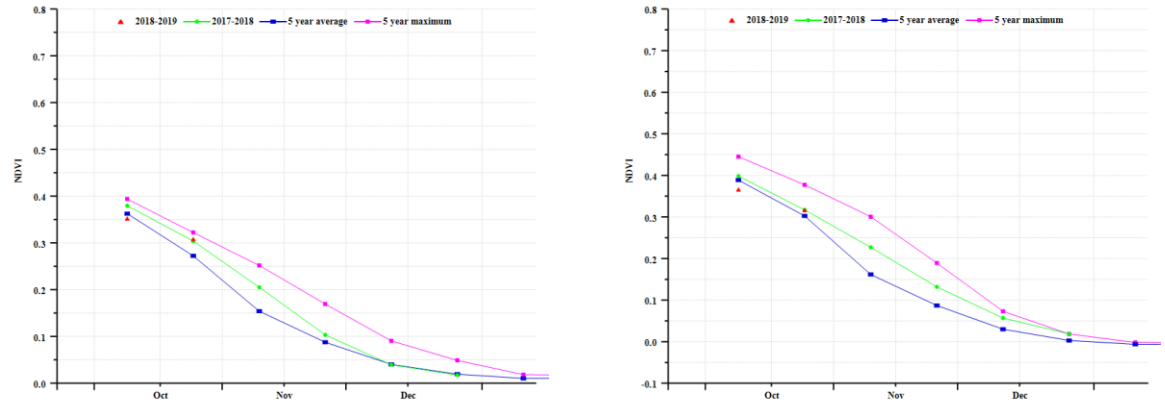

(e) NDVI profiles



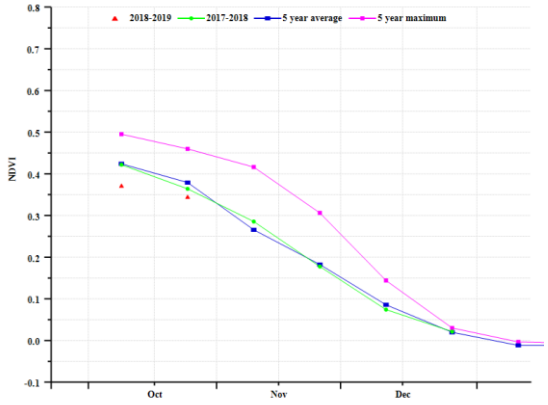

(f) Crop condition development graph based on NDVI (The Caucasus (left) and Central Economic Region (right))




(g) Crop condition development graph based on NDVI (Kaliningrad oblast (left) and Northwest region (right))




(h) Crop condition development graph based on NDVI (Southern Siberian area (left) and Southern Urals (right))




(i) Crop condition development graph based on NDVI (Volga Basin)

**Table 3.65. Russia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October-January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Amur and Primorsky Krai | 126 | 13 | -11.0 | 2.5 | 377 | -1 |
| Central Russia | 225 | -27 | -2.4 | -0.6 | 151 | 15 |
| Central Black Earth | 214 | -22 | -1.9 | -1.0 | 220 | 14 |
| East Siberian | 179 | -2 | -9.0 | 2.4 | 350 | 1 |
| Middle Siberian | 114 | -9 | -13.7 | 1.3 | 316 | 1 |

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m2) | Departure from 15YA (%) |
| Middle Volga | 220 | -16 | -4.9 | -0.6 | 186 | 6 |
| Northwest Region including Novgorod | 268 | -21 | -1.2 | -0.1 | 116 | 12 |
| North Caucasian | 304 | 38 | 2.3 | -0.3 | 327 | 0 |
| South Caucasian | 374 | 9 | 3.6 | 0.5 | 422 | 0 |
| Ural and west Volga-Vyatka | 170 | -8 | -7.6 | 0.2 | 177 | 2 |
| West Siberian | 218 | 0 | -9.6 | -0.2 | 220 | 5 |
| West subarctic region | 289 | -12 | -4.7 | 0.1 | 72 | 1 |

**Table 3.66. Russia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October-January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Amur and Primorsky Krai | 344 | 27 | 77 | 4 | 0.85 |
| Central Russia | 574 | -6 | 99 | 1 | 0.95 |
| Central Black Earth | 611 | -8 | 75 | 3 | 0.82 |
| East Siberian | 396 | 19 | 89 | -3 | 0.81 |
| Middle Siberian | 249 | 12 | 33 | 27 | 0.85 |
| Middle Volga | 485 | -6 | 61 | -7 | 0.70 |
| Northwest Region including Novgorod | 625 | -2 | 100 | 1 | 0.89 |
| North Caucasian | 808 | 9 | 50 | 8 | 0.75 |
| South Caucasian | 821 | 8 | 48 | -15 | 0.74 |
| Ural and west Volga-Vyatka | 404 | -1 | 65 | 25 | 0.79 |
| West Siberian | 364 | -2 | 62 | 24 | 0.86 |
| West subarctic region | 476 | -2 | 98 | 6 | 0.90 |

# [THA] Thailand

The planting of the second rice crop started in early January, while the harvest of the main rice has been completed. During this monitoring period, temperature (TEMP +0.5℃), rainfall (RAIN +10%) and radiation (RADPAR +4%) were above average, which led to a 20% increase in BIOMSS. Nationwide, crop condition was slightly below average as shown in NDVI development graph. NDVI departure profiles clustering shows that in 22.6% of the country crop condition was below average before December but it recovered later as the second rice crop was planted. This applies to the center of Central double and triple-cropped rice lowlands and the south of Western and southern hill areas. In the North-eastern single-cropped rice region, which represents 48.8% of arable lands in Thailand, crop condition was slightly below average. Crop condition was persistently below average in 22.8% of arable land, mostly in the form of patches occurring throughout the country). Altogether, considering the favorable VCIx value of 0.84, the crop condition is assessed as average.

**Regional analysis**

The regional analysis below focuses on some of the already mentioned agro-ecological zones of Thailand, of which some are mostly defined by the rice cultivation typology. Agro-ecological zones include Central double and triple-cropped rice lowlands (115), South-eastern horticulture area(116), Western and southern hill areas(117), Single-cropped rice north-eastern region(118). The numbers correspond to the labels in the VCIx and NDVI profile maps.

Compared with average, the rainfall in the **Central double and triple-cropped rice lowlands** was virtually average (RAIN -2%) while temperature was above average (TEMP, +0.6℃) with average sunshine (RADPAR 0%). The biomass production potential increased 22%. The NDVI development graph shows that crop condition was slightly below the five-year average but close to last year's. This is confirmed by a fair VCIx value of 0.85. Overall, the situation was slightly below average.

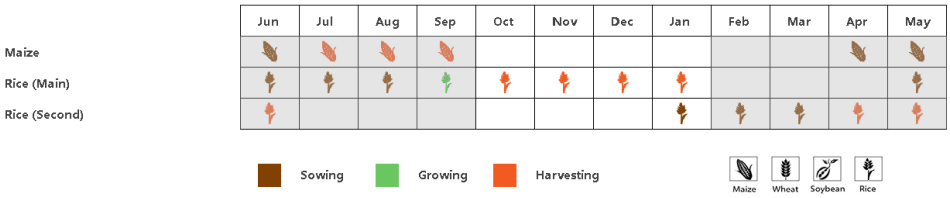
Indicators for the **South-eastern horticulture area** follow the same patterns as those for the country as a whole: rainfall (RAIN, 2%) and radiation (RADPAR +4%), temperature (TEMP, +0.3℃) were above average, resulting in the biomass production potential increase in Thailand (BIOMSS +21%) compared with the 5-year average. According to the NDVI development graph, however, the crop condition was slightly below average during this monitoring period.

Crop condition in the **Western and southern hills areas** were favorable and, again, followed the weather patterns as the whole country: RAIN +16%, TEMP +0.2°C, RADPAR +2%, and BIOMSS +23% when compared to their respective averages. According to the NDVI development graph, crop condition was close to average. Overall, the situation was close to average.

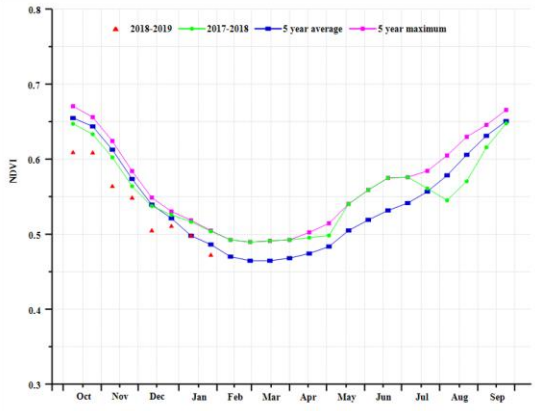
Unlike the country as a whole, the rainfall in the **Single-cropped rice north-eastern region** was virtually average while the temperature (TEMP +0.8°C) and radiation (RADPAR +7%) were above. BIOMSS (+10%) shows above average values. The NDVI development graph shows that crop condition was slightly below average.

At the national level, most arable lands was cropped during the season and had favorable VCIx values around 0.84. CropWatch projections are that the crop condition during this monitoring period was slightly below average.

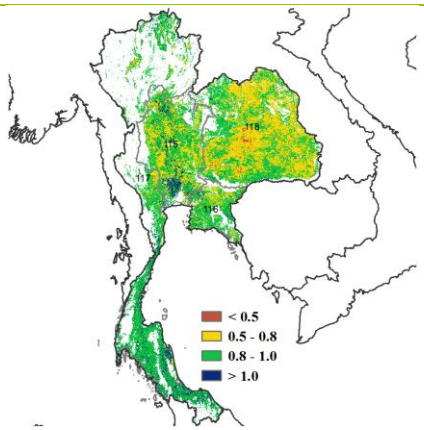
**Figure 3.38. Thailand's crop condition, October 2018-January 2019**



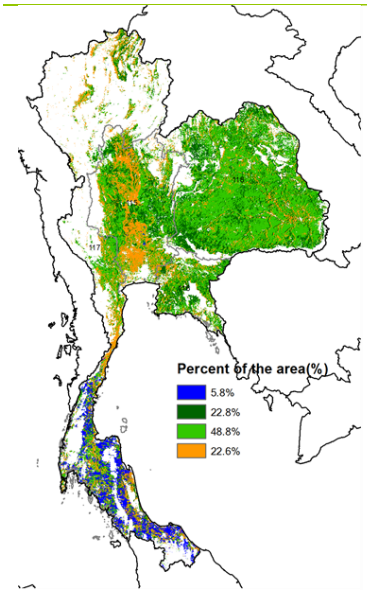

(a). Phenology of major crops



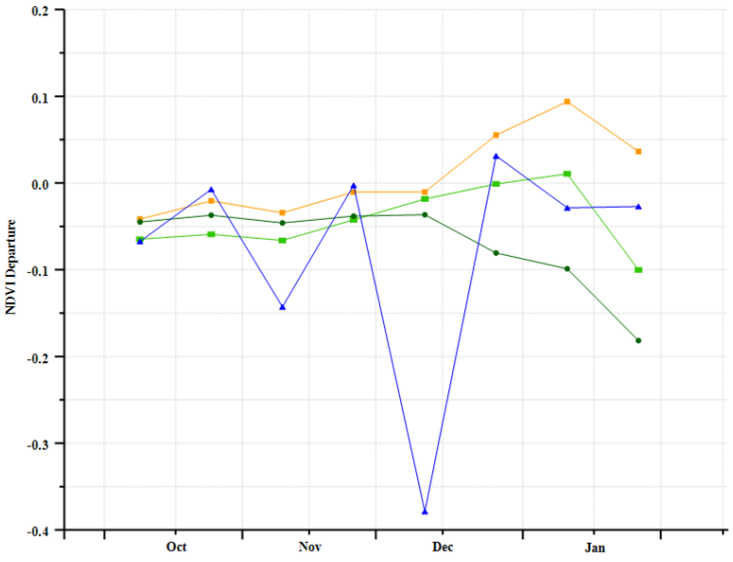

(b) Crop condition development graph based on NDVI



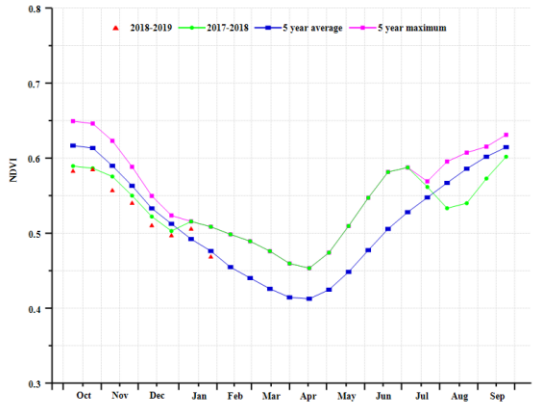

(c) Maximum VCI

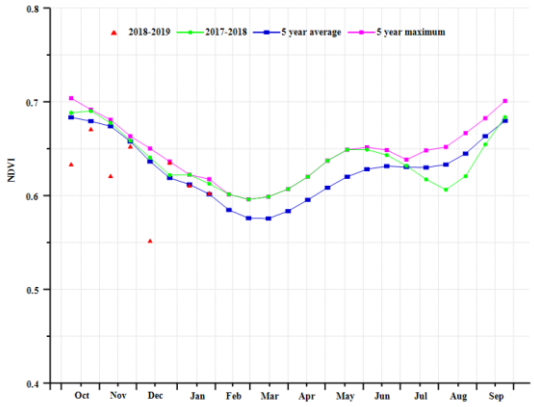



(d) Spatial NDVI patterns compared to 5YA

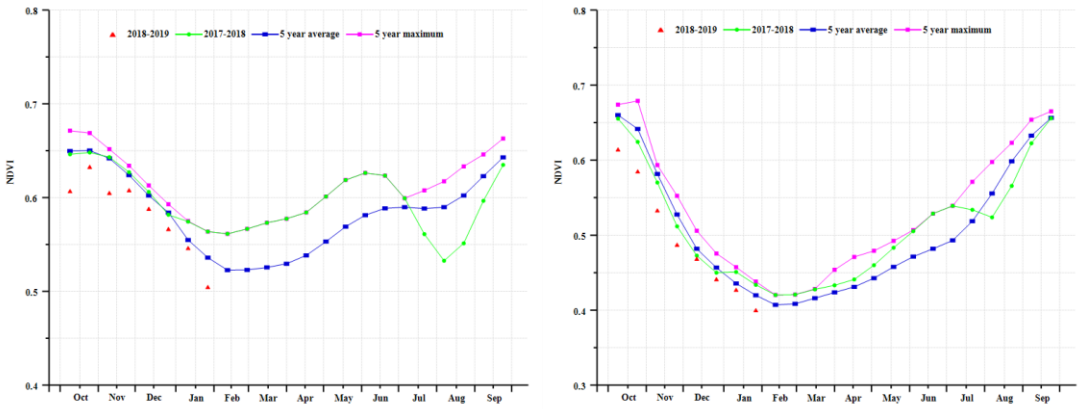



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Central double and triple-cropped rice lowlands (left) and Western and southern hill areas (right))




(f) Crop condition development graph based on NDVI (South-eastern horticulture area (left) and Single-cropped rice north-eastern region (right))

**Table 3.67. Thailand's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018- January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Central double and triple-cropped rice lowlands | 232 | -2 | 26.6 | 0.6 | 1070 | 0 |
| South-eastern horticulture area | 337 | 2 | 26.9 | 0.3 | 1129 | 4 |
| Western and southern hill areas | 641 | 16 | 25.1 | 0.2 | 1094 | 2 |
| Single-cropped rice north-eastern region | 186 | 0 | 26.3 | 0.8 | 1112 | 7 |

**Table 3.68. Thailand's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018- January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Central double and triple-cropped rice lowlands | 737 | 22 | 100 | 1 | 0.85 |
| South-eastern horticulture area | 979 | 21 | 99 | 0 | 0.86 |
| Western and southern hill areas | 1277 | 23 | 100 | 0 | 0.93 |
| Single-cropped rice north-eastern region | 519 | 10 | 100 | 0 | 0.78 |

# [TUR] Turkey

Maize and rice harvests were reaching completion at the beginning of the reporting period, while winter wheat planting was underway. NDVI was close to the previous five-year average from October to early December 2018. After a marked dip (0.1 NDVI units) in early January, it returned to average by the end of the month. Both temperature, rainfall and the resulting biomass accumulation potential were above average (TEMP +0.9℃, RAIN +26%, BIOMSS +17%) but sunshine was low (RADPAR -8%). The cropped arable land fraction (CALF) increased by 18% and the maximum VCI was 0.86.

The spatial NDVI patterns almost exactly follow the AEZs decribed in the regional analysis below. For instance, NDVI was close or slightly above average in 21.8% of croplands, mostly in the lowlands along the Syrian border and the Mediterranean, from the Sanliurfa to Antalya to Aydin and Tekirdag in the European part of Turkey. This corresponds to the Marmara Aegean Mediterranean lowland zone and mostly high VCIx.

**Regional analysis**

The regional analysis covers four agro-ecological zones (AEZ): the Black Sea area, Central Anatolia, Eastern Anatolia and Marmara Aegean Mediterranean lowland zone.

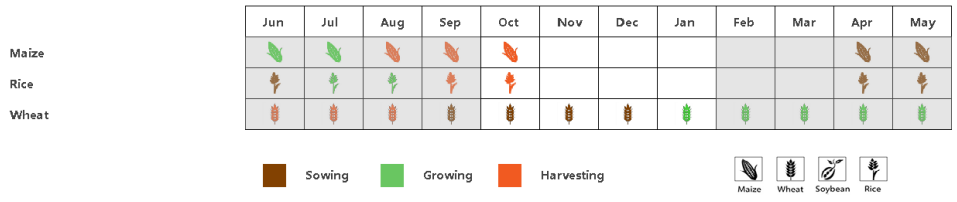
In the **Black Sea zone**, the NDVI was close and above average from October to December, while the NDVI was below average in January. Rainfall and temperature were well above average (RAIN +32%, TEMP +1.1℃) and sunshine was close to average (RADPAR -1%). The biomass was above average (BIOMSS +19%); VCIx reached 0.92 and CALF is up 3%. The tea, not crops, may result high high VCIx and the increasing of biomass. Good climatic conditions were favorable for the crops. The output will be fair.

The **Central Anatolian region** had below average NDVI in late December and January, but average and above average from October to early December. Both temperature and precipitation were above average (TEMP +0.9℃, RAIN +17%), while the radiation was below average (RADPAR,-4%). The biomass production potential was above average (BIOMSS +15%), and CALF increased 4%. The VCIx was 0.80. The condition of crops is assessed as good.

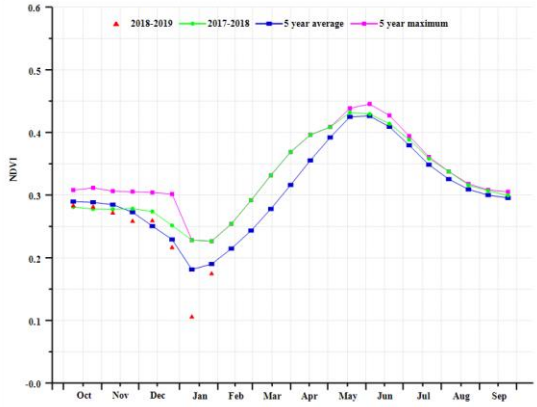
In the **Eastern Anatolian plateau**, the NDVI was below and close to average during the reporting period, but above average on early December and late January. This zone experienced a precipitation excess of the same magnitude as in the two adjacent AEZs (RAIN +31%) but weather was unseasonably warm (TEMP +1.8℃) while sunshine was rather low (RADPAR -11%), a combination that hints at very cloudy conditions (clouds lead to high minimum temperature). Both biomass and the cropped arable land fraction were above average (BIOMSS +18%, CALF +10%), and the VCIx was 0.84. Climatic conditions were favorable for crop production.

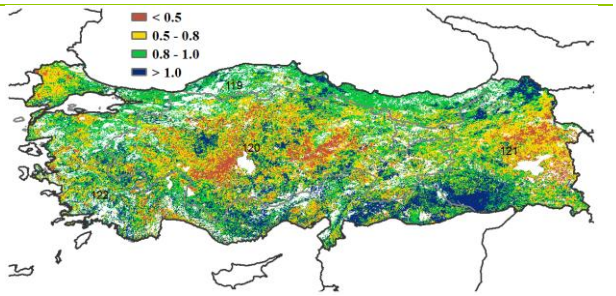
As shown by the NDVI profile in the **Marmara Aegean Mediterranean lowland zone**, the NDVI was below and close average, except during late December. The rainfall was above average (RAIN +29%), while the radiation was below (RADPAR -11%). The temperature was close to average(TEMP, +0.3℃). Both BIOMSS and the CALF are up compared with average, by 18% and 19%, respectively. The VCIx was 0.93. Crop production prospects are estimated to be favorable.

**Figure 3.39. Turkey's crop condition, October 2018-January 2019**



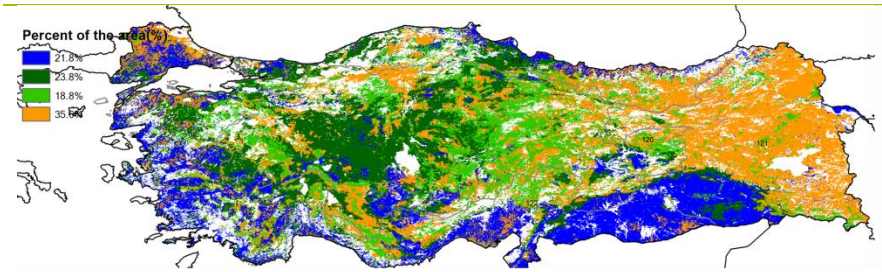
(a). Phenology of major crops

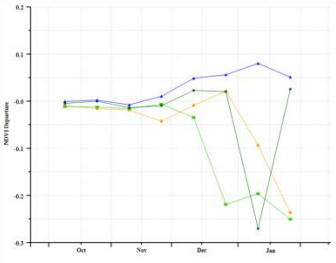



(b) Crop condition development graph based on NDVI

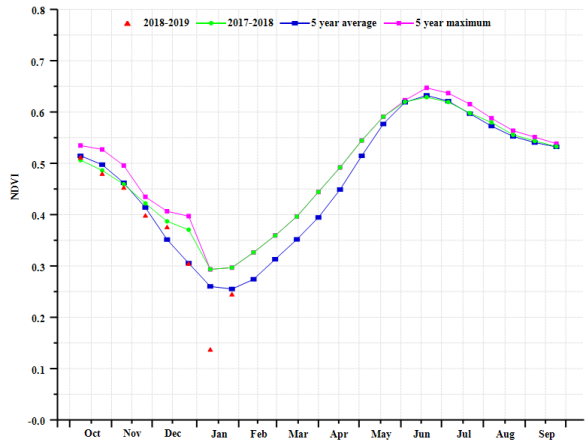
(c) Maximum VCI

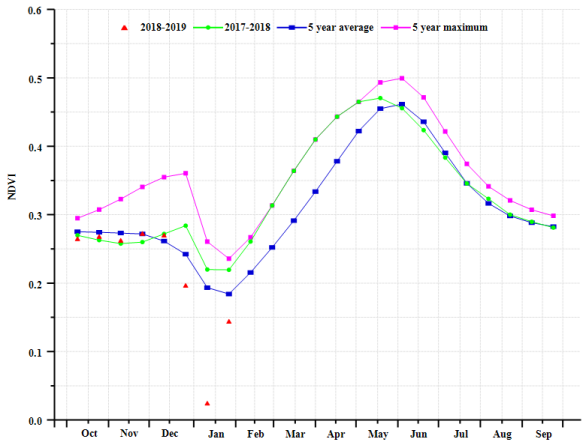


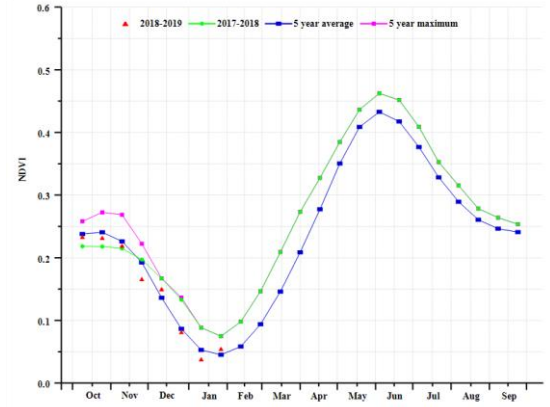
(d) Spatial NDVI patterns compared to 5YA

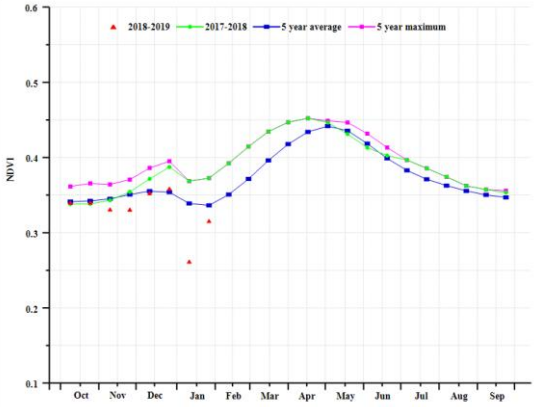
(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Black Sea region (left) and Central Anatolia region (right))




(f) Crop condition development graph based on NDVI (Eastern Anatolia region (left) and Marmara_Agean_Mediterranean lowland region (right))

**Table 3.69. Turkey's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018-January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Black Sea region | 486 | 32 | 7.0 | 1.1 | 470 | -1 |
| Central Anatolia region | 368 | 17 | 5.0 | 0.9 | 556 | -4 |
| Eastern Anatolia region | 380 | 31 | 2.8 | 1.8 | 545 | -11 |
| Marmara Agean Mediterranean lowland region | 475 | 29 | 9.0 | 0.3 | 525 | -11 |

**Table 3.70. Turkey's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018-January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Black Sea region | 1110 | 19 | 78 | 3 | 0.92 |
| Central Anatolia region | 988 | 15 | 18 | 4 | 0.80 |
| Eastern Anatolia region | 783 | 18 | 22 | 10 | 0.84 |
| Marmara Agean Mediterranean lowland region | 1156 | 18 | 65 | 19 | 0.93 |

# [UKR] Ukraine

This monitoring period covers the harvest of maize from October to December and the early stages of winter wheat and rye which were planted between August and October.

At the national level, rainfall (RAIN 257 mm) and sunshine (RADPAR, 288 MJ/m2) were above average (+19% and +7% higher, respectively). Temperature (TEMP, -0.3℃) was close to the average. As a result of favorable weather, agronomic indicators show satisfactory crop development and condition: maximum vegetation condition index (VCIx) reached to 0.85, cropped arable land fraction (CALF) rose 13% above the 5YA to 72% (a low value!) and the contribution of the period to potential biomass reached 848 g DM/m2, +15% above the reference value.

However, national NDVI has been substantially lower than the 5-year average since mid-November, falling to 0.05 in December and January. As shown in the spatial crop condition development map and curves, NDVI varied widely across the country,, reaching low values almost everywhere except in 7.4% of arable lands in mid-southern and western areas, which stayed above the average during late December and mid-January. Maximum VCI reached at least values in the range from 0.5 to 0.8, with few areas below 0.5.

**Regional analysis**

Based on cropping system, climatic zones and topographic conditions, regional analyses are provided below for four agro-ecological zones (AEZ), including the Central wheat area, Northern wheat area, Eastern Carpathian hills, and Southern wheat and maize area.

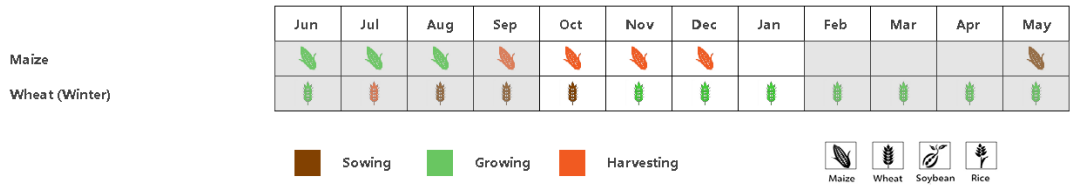
The **Central wheat area** (Poltava,Cherkasy, Dnipropetrovsk and Kirovohrad Oblasts) recorded sufficient rainfall (RAIN 275 mm, +29% compared with average) and radiation (RADPAR, 292 MJ/m2, +11%), but lower temperature (TEMP 1.1 ℃, -0.6℃). The resulting biomass production potential would be up 9% higher than 5-year average (BIOMSS 811 gDM/m2). Agronomic indicators showed a good VCIx (0.84) and moderate CALF (66%). With NDVI consistently lower than the 5-year average, crop prospects are currently unclear and need close monitoring when vegetative growth resumes.

In comparison with average, the **Northern wheat area** (Rivne, Zhytomyr and Kiev oblasts) received 6% lower rainfall,-0.2℃ lower temperature and 11% higher radiation. Generally stable agroclimatic conditions lead to an increase in expected biomass production (BIOMSS +7%). Agronomic indicators showed satisfactory CALF (85%) and VCIx (0.86), indicating satisfactory winter wheat development and condition.

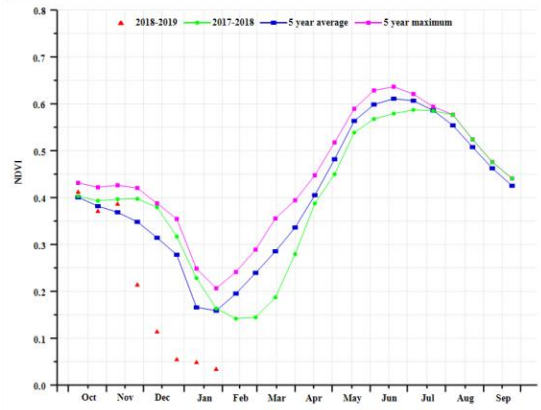
The **Eastern Carpathian hills** (Lviv, Zakarpattia and Ivano-Frankivsk oblasts) experienced abundant rainfall (+15% compared to average), normal temperature (+0℃) and radiation (+2%). Winter weather based biomass projection is 12% higher than average. Agronomic indicators show high CALF (95%) and VCIx (0.9), indicating good crop prospects.

The **Southern wheat and maize area** (Mykolaiv, Kherson and Zaporizhia oblasts) received unusually high rainfall (+48%), while temperature (-0.4℃) and radiation (+4%) were closed to average. As a result of plentiful rainfall, potential biomass was simulated to be 26% higher than 5YA values. A significant increase in CALF (+27%) and relatively high VCIx (0.8) put crop prospects at fair to good.

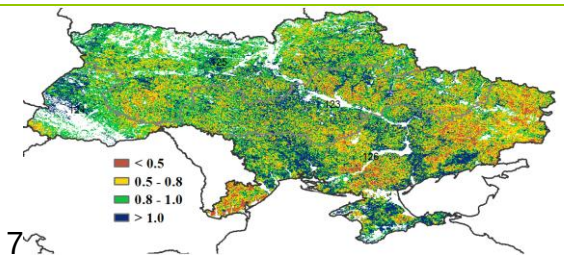
**Figure 3.40. Ukraine's crop condition, October 2018- January 2019**



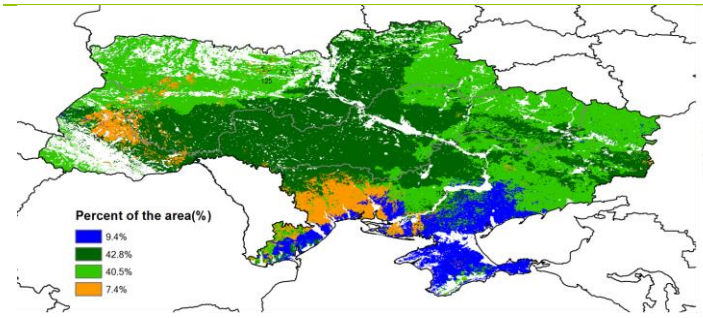

(a). Phenology of major crops



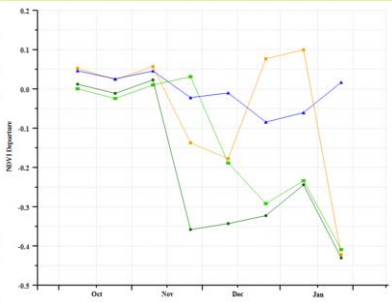

(b) Crop condition development graph based on NDVI



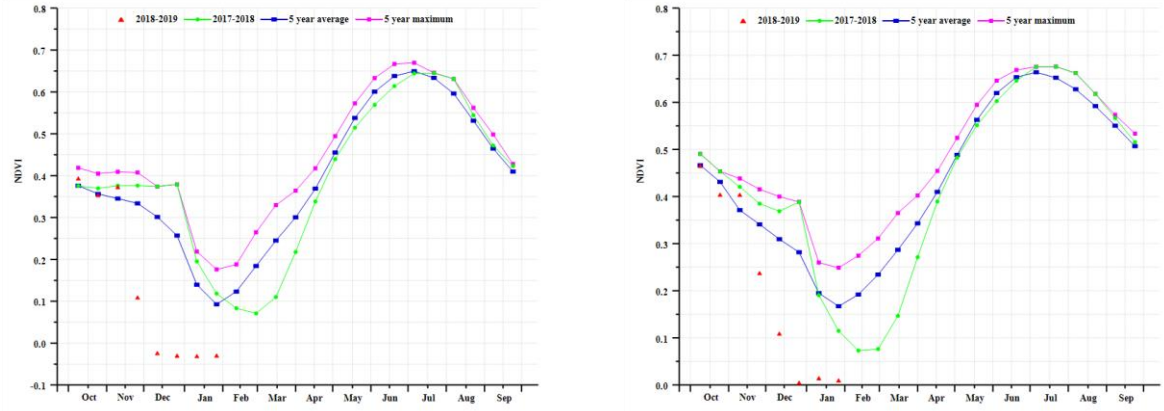

(c) Maximum VCI



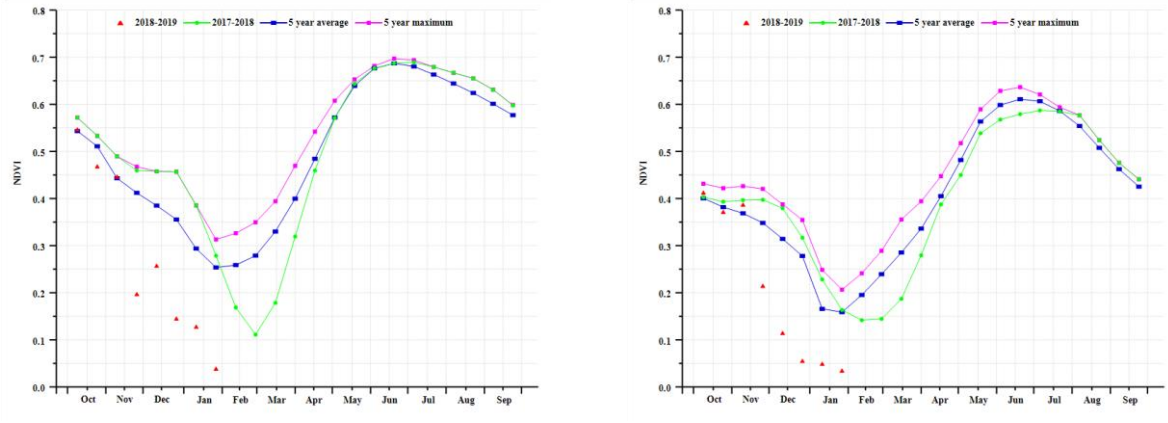

(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Central wheat area (left) and Northern wheat area (right))




(f) Crop condition development graph based on NDVI (Eastern Carpathian hills (left) and Southern wheat and maize area (right))

**Table 3.71. Ukraine's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018- January 2019.**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Central wheat area (Ukraine) | 275 | 29 | 1.1 | -0.6 | 292 | 11 |
| Northern wheat area (Ukraine) | 231 | -6 | 1.3 | -0.2 | 252 | 11 |
| Eastern Carpathian hills (Ukraine) | 280 | 15 | 1.8 | 0.0 | 300 | 2 |
| Southern wheat and maize area (Ukraine) | 269 | 48 | 2.4 | -0.4 | 319 | 4 |

**Table 3.72. Ukraine's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018- January 2019.**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Cebntral wheat area (Ukraine) | 811 | 9 | 66 | 19 | 0.84 |
| Northern wheat area (Ukraine) | 824 | 7 | 85 | 3 | 0.86 |
| Eastern Carpathian hills (Ukraine) | 848 | 12 | 95 | -2 | 0.90 |
| Southern wheat and maize area (Ukraine) | 884 | 26 | 58 | 27 | 0.81 |

# [USA] United States

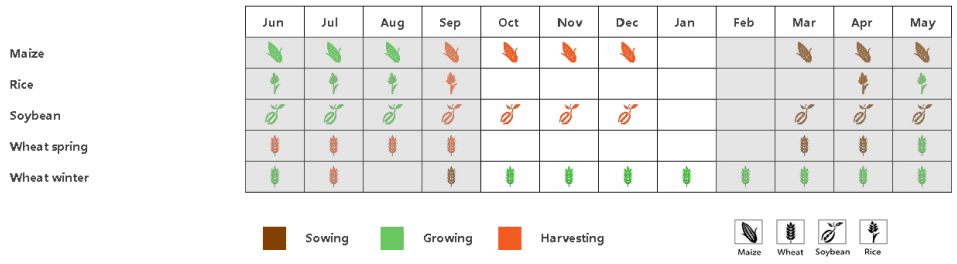
All 2018 crops have now been harvested, up to December for Maize and Soybean. Winter wheat was sown just before the reporting period and is currently mostly dormant.

As a whole, the United States were dominated by "cold and humid" weather: rainfall was above average by 40%, temperature was below by -0.5℃, and sunshine was significantly below seasonal reference values (-7%) due to abundant cloudiness. In most States that recorded abundant precipitation (e.g. Oregon) the accumulated soil moisture will create good initialconditions for the forthcoming summer crops.

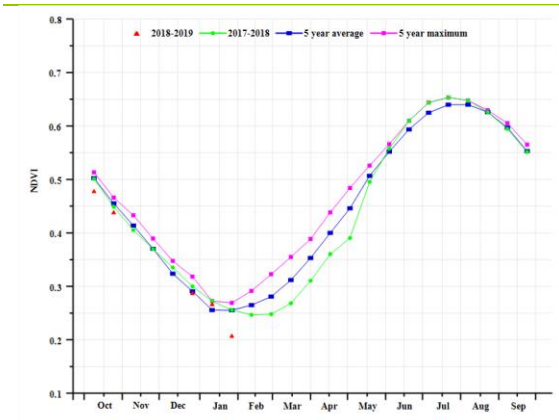
Cold and humid weather prevailed in the Southern Plains, which are the major winter wheat zone in the United States. Precipitation excesses reached 66% in Texas, 51% in Oklahoma, 71% in Kansas and 20% in Nebraska. In those States, temperature and sunshine anomalies (in brackets) reached -1.1℃ (-11%), -1.3℃ (-12%), -1.3℃ (-12%), and -0.6℃ (-6%), respectively. Conditions were more favorable in wheat producers of the North-west: in Washington State, for instance, RAIN and TEMP were slightly above average (+4% and 0.8℃, respectively) but sunshine was more significantly above expected values (RADPAR +8%.)

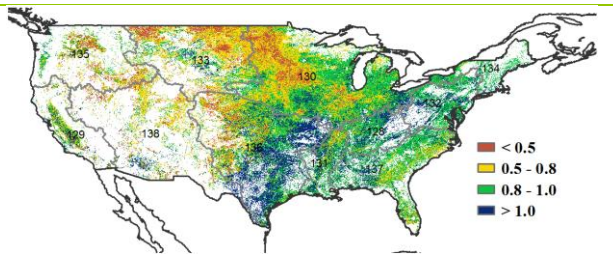
According to NDVI profiles and maximum VCI (0.84 on average), crop growth and development was close to average in the Southern Great Plains and the North-west region. It is worth noting, however, that the fraction of cropped land was down 6% below the average of the recent five years, which was brought about by unfavorable weather; further observations will be required. The maximum VCI map shows above average crop condition (VCIx > 1) in Texas while average or below average crops (VCIx<0.5) occur in Oklahoma, Kansas and Washington. According the NDVI profiles, unsatisfactory crops are more common in Nebraska than in the other four States mentioned. Globally, winter wheat condition is assessed as satisfactory.

**Figure 3.41. United States's crop condition, October 2018 -January 2019**

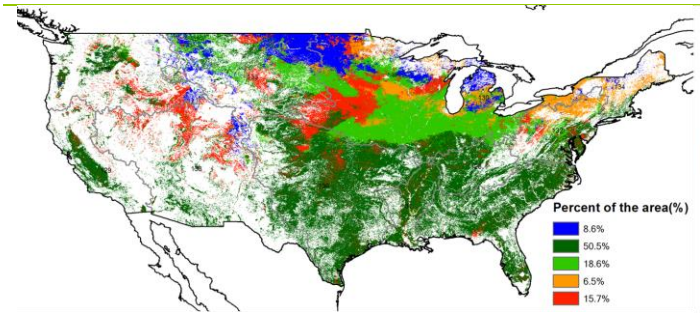



(a). Phenology of major crops

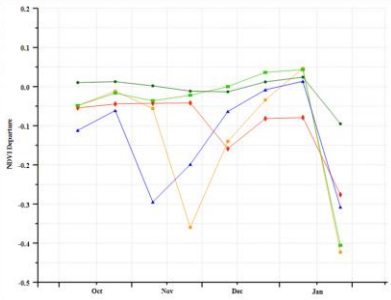


(b) Crop condition development graph based on NDVI




(c) Maximum VCI




(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

# [UZB] Uzbekistan

The monitoring period covers the sowing, early growth and dormancy of winter wheat.Crop condition was generally unfavorable. The national average VCIx was 0.82, a fair value, but the cropped arable land fraction decreased by 30%. TEMP was above average (by 0.5°C) while RAIN and RADPAR dropped below (-12% and -5%, respectively). The combination of factors resulted in average biomass accumulation potential (BIOMSS +1%) compared to the recent five-year average. As shown by the NDVI development graph, crop condition was below five year average in October and close to the average in November. However NDVI was above average from December to January. For 74.3% of the agriculture areas spatial NDVI clusters and profiles show an above average situation from December to early January. This includes mainly parts of the Guliston, Jizzakh, Qarshi, Kasan, Mubarek, Qunghirot, Altynkul, Samarqand, Termez, Denau and Chimbay provinces. The eastern four provinces (Quqon, Farghona, Namagan and Andijon) has the lowest NDVI.

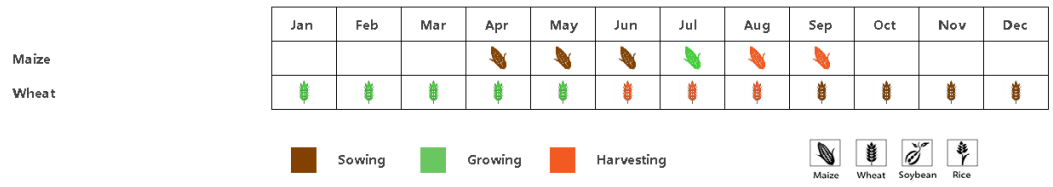
**Regional analysis**

For the regional analysis, additional detail is provided for two major agro-ecological zones in the country, referred to as the Eastern hilly cereals zone and the Aral Sea cotton zone.

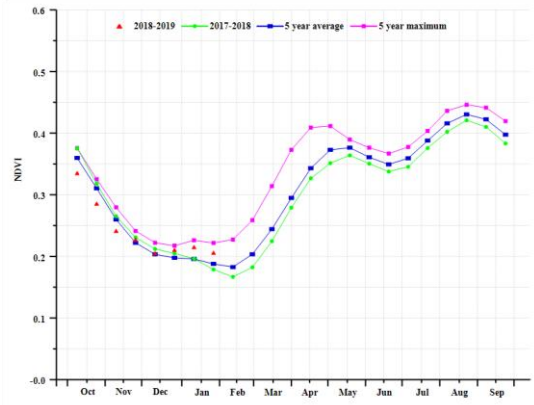
In the Eastern hilly cereals zone, NDVI was below the five-year average from October to November. The RAIN and RADPAR were below average (-13% and -6%) and TEMP was above (+0.5°C). The combination of the factors resulted in high BIOMSS (+3%) compared to the five-year average. The maximum VCI index was 0.83. The cropped arable land fraction decreased by 26%. Overall crop prospects are unfavorable.

The Aral Sea cotton zone, experienced crop condition below the five years average from October to November and above the average from November to late January. Accumulated rainfall and radiation were below average during the monitoring period (RAIN -2% and RADPAR -3%), temperature was above average (TEMP +0.7°C). The BIOMSS index decreased by 5% compared to the five-year average. The maximum VCI index was 0.76, while the cropped arable land decreased by 82%. Overall crop prospects are unfavorable.

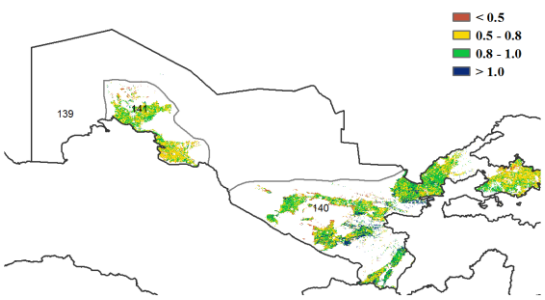
**Figure 3.42. Uzbekistan's crop condition, October 2018-January0 2019**



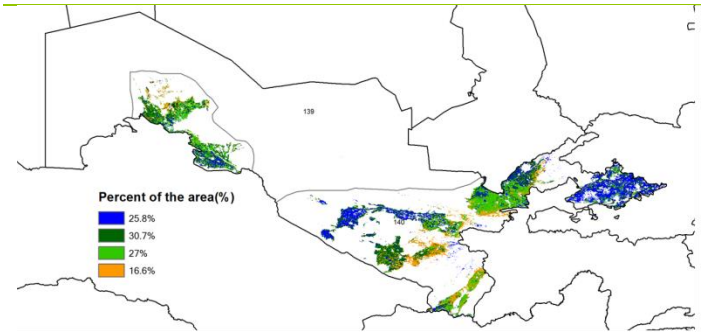

(a). Phenology of major crops



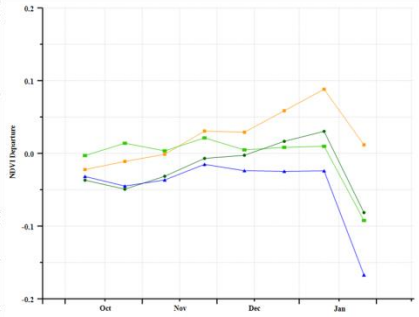

(b) Crop condition development graph based on NDVI



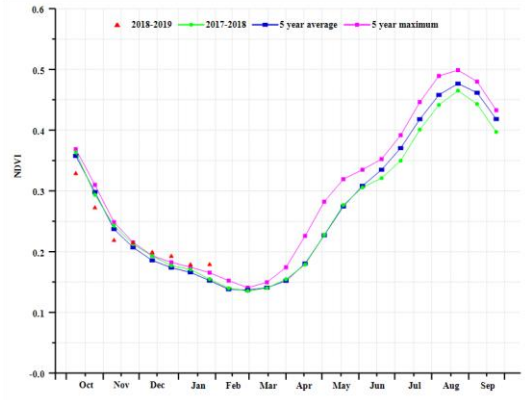

(c) Maximum VCI

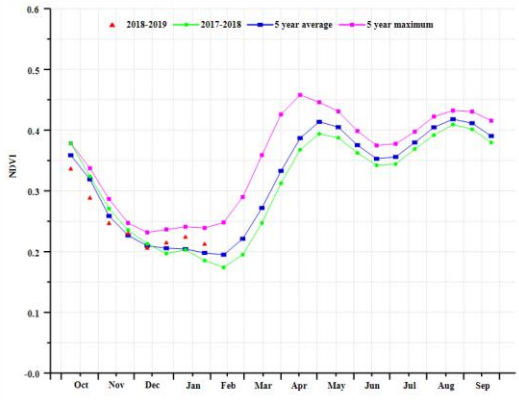



(d) Spatial NDVI patterns compared to 5YA

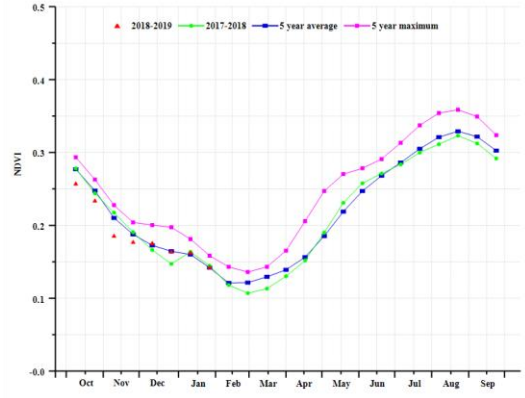



(e) NDVI profiles




(f) Crop condition development graph based on NDVI Cotton region(left) Eastern hilly cereals region (right)




(g) Crop condition development graph based on NDVI Central region with sparse crops

**Table 3.73. Uzbekistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018-January0 2019**

| Region | RAIN | TEMP | RADPAR |
|---|---|---|---|

| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current (MJ/m$^2$) | Departure from 15YA (%) |
|---|---|---|---|---|---|---|
| **Aral Sea cotton zone** | 212 | -2 | 3.0 | 0.7 | 525 | -3 |
| **Eastern hilly cereals zone** | 195 | -13 | 5.3 | 0.5 | 584 | -6 |
| **Central region with sparse crops** | 263 | -5 | 3.5 | 0.7 | 537 | -1 |

**Table 3.74. Uzbekistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018-January0 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current (gDM/m$^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| **Aral Sea cotton zone** | 560 | -5 | 1 | -82 | 0.76 |
| **Eastern hilly cereals zone** | 621 | 3 | 15 | -26 | 0.83 |
| **Central region with sparse crops** | 455 | -19 | 0 | -100 | 0.73 |

# [VNM] Vietnam

The monitoring period covers the growth of the 10th month rice, as well as the sowing of winter and spring rice. Most of the rice cultivation regions are distributed over the northern Red River delta and the Mekong Delta in the south. Overall, crop condition exceeds the 5YA reference in 34.2% of arable lands (mainly in the south of the country) where VCIx values above 0.8 confirm the favorable situation. Unfavorable crops occur in about 39.7% of crop areas (mainly in the north of the country) after November. CropWatch indicators show that sunshine (RADPAR+4%), CALF (0.95), temperature (+0.5°C), BIOMSS (+23%) and VCIx (0.96) were above their respective reference averages (15YA and 5YA). Only precipitation was below the average (-8%). Overall crop condition in the country is unsatisfactory.

**Regional analysis**

Based on cropping systems, climatic zones, and topographic conditions, several agro-ecological zones (AEZ) can be distinguished for Vietnam, among which three are most relevant for crops cultivation: Northern zone with Red river Delta, the Central coastal areas from Thanh Hoa to Khanh Hoa and Southern zone with the Mekong Delta.

The Northern zone recorded abundant rainfall (RAIN +39%), about average RADPAR (-4%) and average TEMP (+0.4°C). With high CALF (99%) and VCIx (0.93), the BIOMSS significantly increased (56%) compared to the average (5YA). The NDVI development graph has values above the 5YA only in November, after which the values decreased. Based on the agro-climatic indicators and NDVI development graph, below average output is likely.

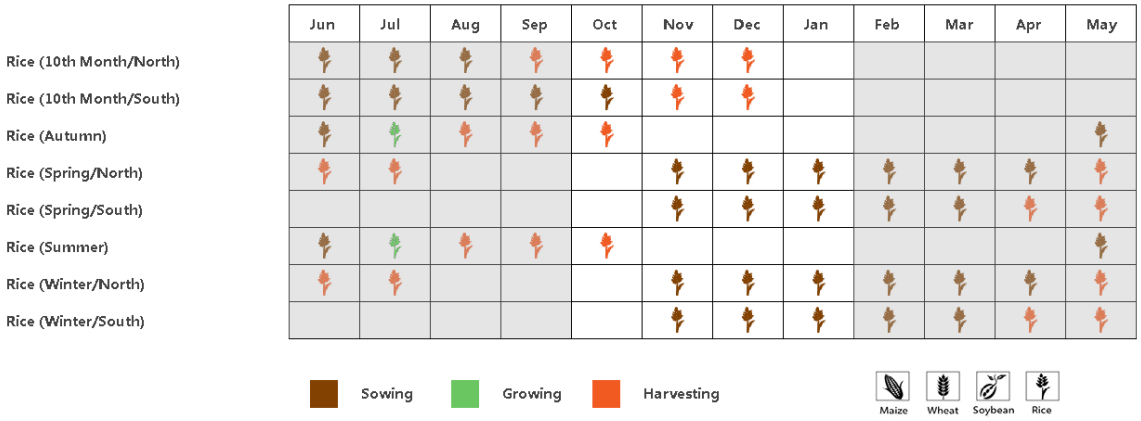
The situation and expected impact on crop production in the Central coastal areas is conditioned by low rainfall and average temperature (RAIN -40%, TEMP +0.7°C). Sunshine was abundant (RADPAR +13%). BIOMSS is up just 3% but VCIx (0.98) and CALF (+3%) describe fair to good condition. The crop condition development graph based on NDVI is erratic behavior and its interpretation is inconclusive. According to agro-climatic indicators, below average output is likely for rain-fed crops. Irrigated crops should be doing fine.

The fraction of cropped arable land (CALF) in the Southern zone for the reporting period is similar to the five-year average (+2%). Vegetation condition indices (maximum VCI) are quite favorable (0.95), accompanied by an increase in BIOMSS (+20%) resulting from average rainfall (RAIN, +2%) along with an increase in radiation (RADPAR, +6%) and average temperature (TEMP, +0.4°C). The crop condition development graph of NDVI indicates values that are about the average of 5 years. CropWatch expects good production in the area.

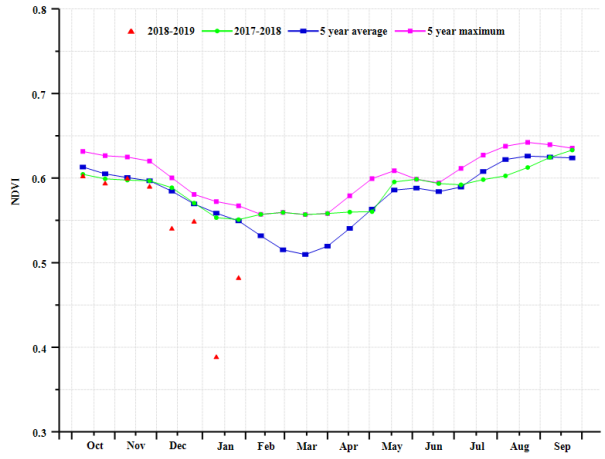
Over 80% of the croplands show average or below average crop condition. Overall, with the mentioned caveats, crop prospects are expect to be just fair.

.

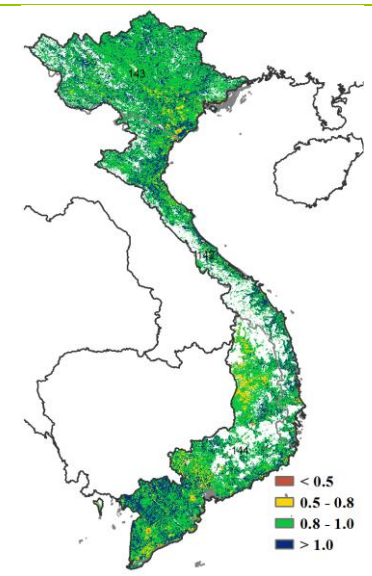
**Figure 3.43. Vietnam's crop condition, October 2018 - January 2019**



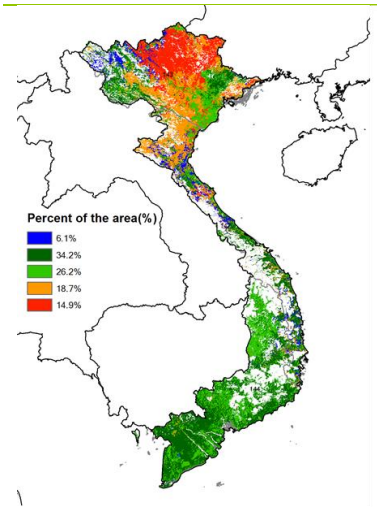

(a). Phenology of major crops



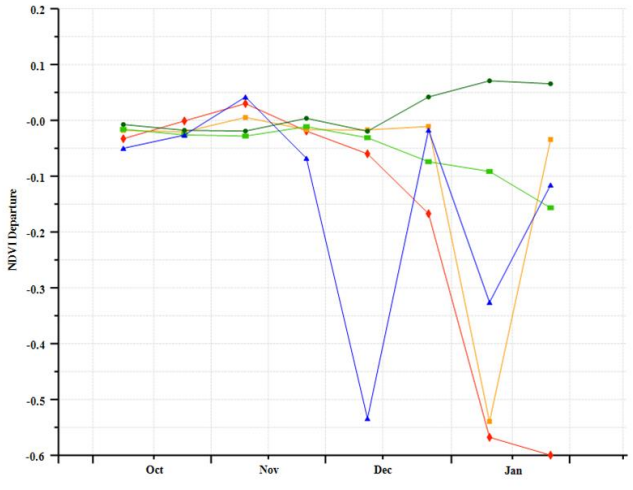

(b) Crop condition development graph based on NDVI



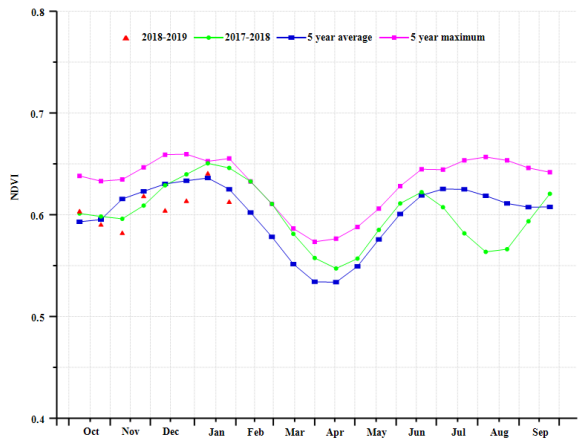

(c) Maximum VCI

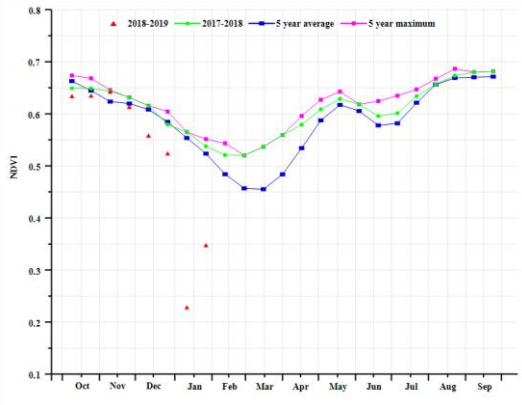



(d) Spatial NDVI patterns compared to 5YA

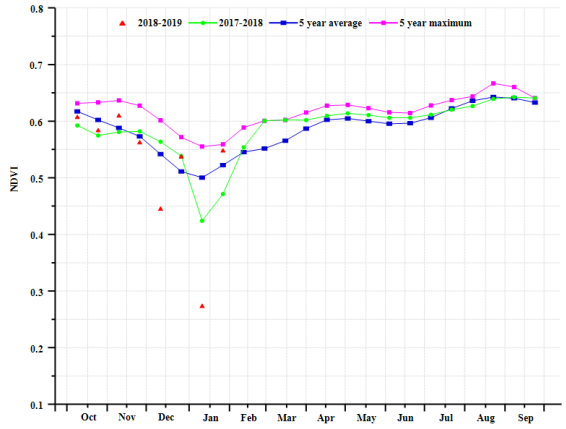



(e) NDVI profiles




(f) Crop condition development graph based on NDVI(Northern zone), and (Central coastal areas).




(g) Crop condition development graph based on NDVI(Southern zone).

**Table 3.75. Vietnam's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018-January0 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| North_Vietnam | 256 | 39 | 18.8 | 0.4 | 680 | -4 |
| Central_Vietnam | 384 | -40 | 23.6 | 0.7 | 766 | 13 |
| South_Vietnam | 582 | 2 | 25.5 | 0.4 | 1087 | 6 |

**Table 3.76. Vietnam's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018-January0 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| North_Vietnam | 804 | 56 | 99 | 1 | 0.96 |
| Central_Vietnam | 986 | 3 | 97 | 3 | 0.98 |
| South_Vietnam | 1386 | 20 | 96 | 2 | 0.95 |

# [ZAF] South Africa

During the monitoring period, winter wheat was harvested and in the summer rainfall areas of the Center and East soybean and especially maize are currently growing and have reached mid-season stages (flowering). Precipitation (RAIN) was 15% below average, TEMP was average (+0.1°C) and sunshine, as estimated by RADPAR, was 8% above the average. Due to the rainfall deficit, the biomass accumulation potential (BIOMSS) fell 19% below the average. Overall, the VCIx value estimated for whole country was 0.62.

The nationwide NDVI-based crop development graph shows unfavorable conditions below the recent five years average at some stage of the season. Average condition characterizes about 21.6% of cropland, mostly in eastern coastal areas of Kwazulu-Natal and north-east Eastern Cape. VCIx is mostly high.

The most unfavorable NDVI values occur in south-western Eastern Cape (13.1% of arable land areas).

Gauteng and the northern province (35.9% of crop land) went through a period with low NDVI in December, but have since reached rather large positive departures up to 0.2 NDVI units. VCIx values tend to be above 0.8, which would indicate favorable crops.

Constantly deteriorating NDVI affects the central Free State and central North-west province. This is also the area where VCIx is lowest, confirming unfavorable crop condition.

**Regional analysis**

CropWatch adopts four agro-ecological zones (AEZs) relevant for crop production in South-Africa: The Humid Cape Fold mountains, the Dry Highveld and Bushveld maize areas, the Mediterranean zones and the Arid and desert zones.

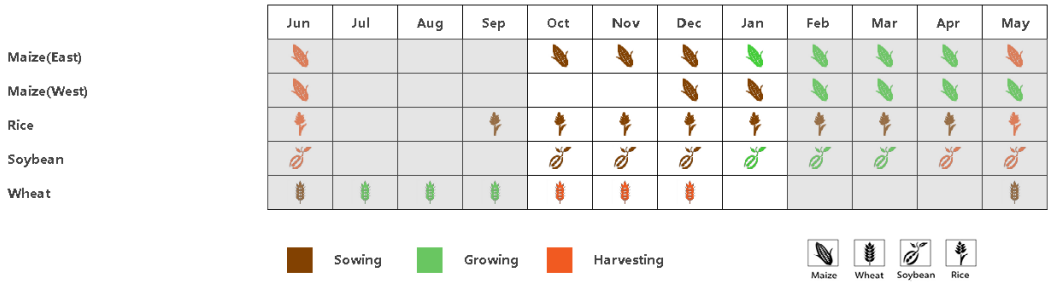
In the Humid Cape Fold mountains, the average rainfall (RAIN) was 363 mm, 7% below the average, while RADPAR was 7% above the average and BIOMSS 12% below. The NDVI-based crop conditions graph show values that are below the 5 years average from October. The VCI value for the whole zone was the highest among the other zones at 0.69. As mentioned above, this covers satisfactory crops in the northern areas of the AEZ.

In the Mediterranean zone, where the agricultural season is now over, the average rainfall (RAIN) was just 37 mm, 56% below the average, leading to a 51% reduction in estimated BIOMSS compared to the average. The TEMP was 18.9°C, 0.2°C above the average, and the estimated RADPAR was 3% above the average. Although the NDVI-based crop conditions graph shows that the conditions were above or at the 5 years average conditions during the reporting period, the maximum VCI for whole zone was low (0.39). The CALF was 0.6, 3% below the average.

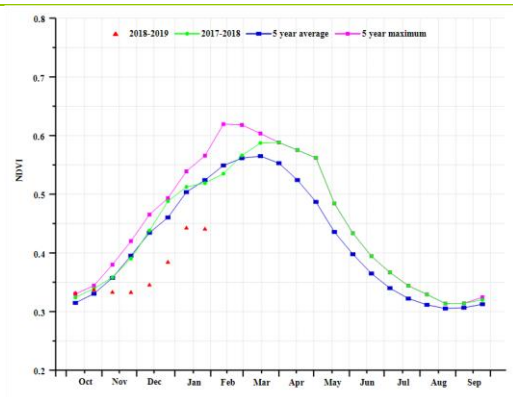
In Dry Highveld and Bushveld maize areas, the rainfall (RAIN) was 352mm, 15% below the average, and the TEMP was 21.3°C, 0.1°C above the average. The estimated RADPAR was 9% above the average, while the BIOMSS was 17% below the average. The CALF was only 0.57, 4% below the average. The maximum VCI was 0.64. The NDVI-based crop conditions graph show is crop condition above 5-year average from November. As mentioned above crops in the northern part are in better shape than in the East.

Mostly unfavorable climatic conditions dominated the Arid and desert zones over the reporting period. Rainfall was 58% below average (71 mm over four months). The dry conditions have hampered crop growth, indicated also by a BIOMSS indicator 56% below average for the period. The region is, however, of marginal agricultural importance.

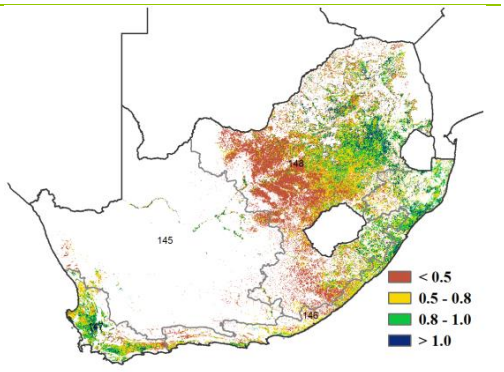
**Figure 3.44. South Africa's crop condition, October 2018 - January 2019**



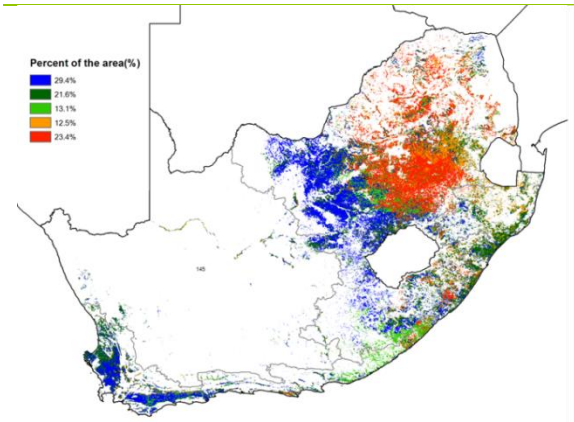

(a). Phenology of major crops



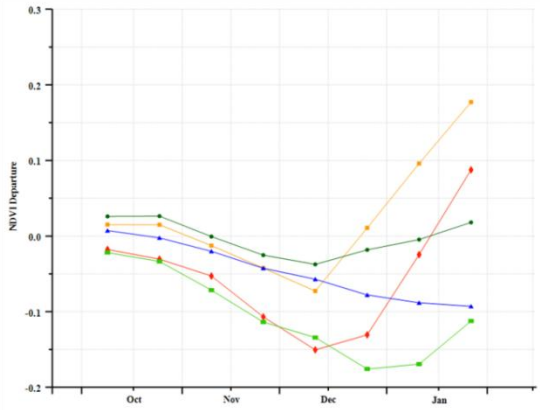

(b) Crop condition development graph based on NDVI



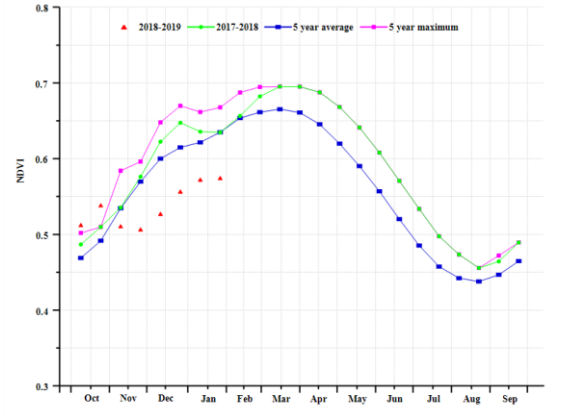

(c) Maximum VCI

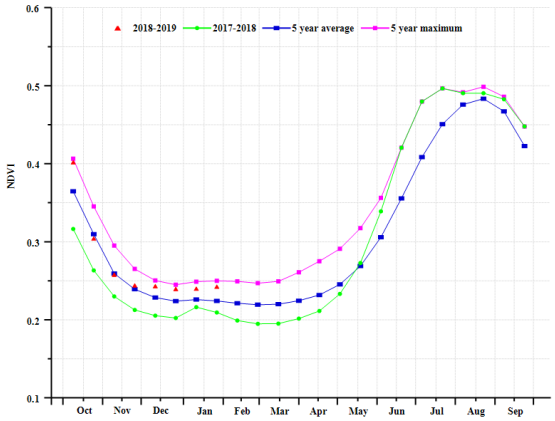



(d) Spatial NDVI patterns compared to 5YA

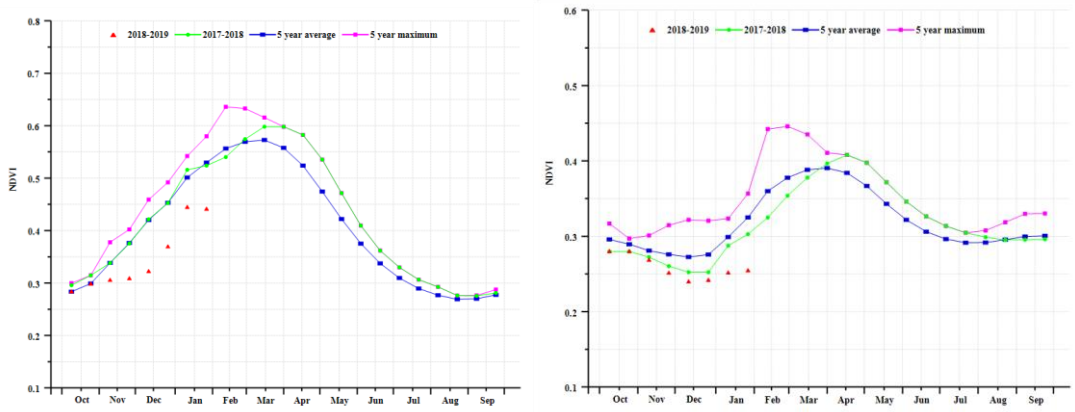



(e) NDVI profiles




(f) Crop condition development graph based on NDVI (Humid Cape Fold Mountains (left) and Mediterranean wheat zone (right))




(f) Crop condition development graph based on NDVI (Dry Highveld and Bushveld maize zone)

**Table 3.77. South Africa's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, October 2018 - January 2019**

| Region | RAIN | | TEMP | | RADPAR | |
|---|---|---|---|---|---|---|
| | Current (mm) | Departure from 15YA (%) | Current (°C) | Departure from 15YA (°C) | Current ($MJ/m^2$) | Departure from 15YA (%) |
| Humid Cape Fold Mountains | 363 | -7 | 20.5 | -0.4 | 1356 | 7 |
| Mediterranean Zone | 37 | -56 | 18.9 | 0.2 | 1632 | 3 |
| Dry Highveld and Bushveld | 352 | -15 | 21.3 | 0.1 | 1605 | 9 |
| Arid and desert zones | 71 | -58 | 22.0 | 0.9 | 1744 | 7 |

**Table 3.78. South Africa's agronomic indicators by sub-national regions, current season's values and departure from 5YA, October 2018 - January 2019**

| Region | BIOMSS | | Cropped arable land fraction | | Maximum VCI |
|---|---|---|---|---|---|
| | Current ($gDM/m^2$) | Departure from 5YA (%) | Current | Departure from 5YA (%) | Current |
| Humid Cape Fold Mountains | 1037 | -12 | 0.9 | 0 | 0.7 |
| Mediterranean Zone | 164 | -51 | 0.6 | 3 | 0.4 |
| Dry Highveld and Bushveld | 1101 | -17 | 0.6 | -4 | 0.6 |
| Arid and desert zones | 269 | -56 | 0.2 | 1 | 0.6 |

# [ZMB] Zambia

The analyzed period coincides with the onset of the rainy season in the country. Based on the NDVI clusters, the general condition of crops was below average due to rainfall deficits during the establishment of the rainy season. The main cultivated areas had VCIx values between 0.5-1.0. In spite of reduced precipitation (14% below average) this represents much improved condition compared to the previous season where the whole country experienced a severe rainfall deficit leading to poor crop establishment. However, the CALF indicates a stable build up as the season progresses. A 25% below average value in CALF with a corresponding 15% reduction in Biomass were observed. The temperatures dropped slightly across the entire growing areas. RADPAR was average or slightly below average.

## Regional analysis

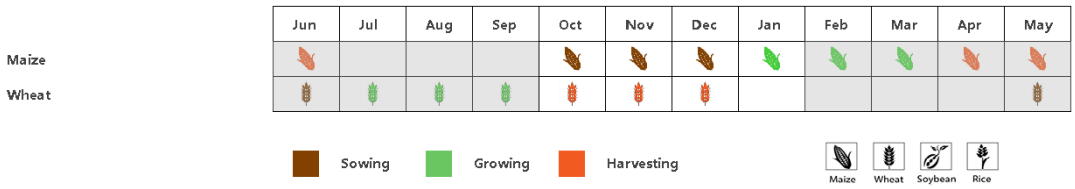
The analysis covers three agro-ecological zones (AEZs): Zone I (<800mm, 80 -120 days) constitutes about 10 percent of the country and covers Luangwa and Zambezi river valleys; Zone II (800 - 1000mm, 100 - 140 days) covers 48 percent of the country, and Zone III (>1000mm, 120 - 180 days) constituting about 42 percent of the total land area. The rainfall is brought by the Inter-tropical Convergence Zone (ITCZ) and is characterized by thunderstorms, occasionally severe, with much lightning and sometimes hail. Most of the agricultural activities occur in Zone II as this zone enjoys relatively good ecological conditions and services.

The reported period was the planting period for rain-fed crops (maize, tobacco, ground nuts, sunflower, soybeans, vegetables, sweet potatoes, cotton) as observed from the VCIx exceeding 0.5. The main cropping season has been generally below average, resulting from dry conditions especially in southern and western parts of the country, i.e. key cereal-producing areas.

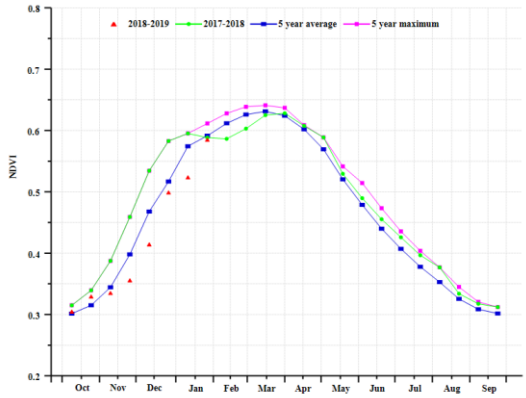
Zone II, the main maize producing area received 8% below average rainfall and 20% increment in RADPAR; NDVI clusters confirm the slightly below average crop conditions experienced in the zone.

Overall, the crop condition in the main cropping areas is fairly average. Final yields may be affected by dry spells later in the season, most critically at the time of flowering.

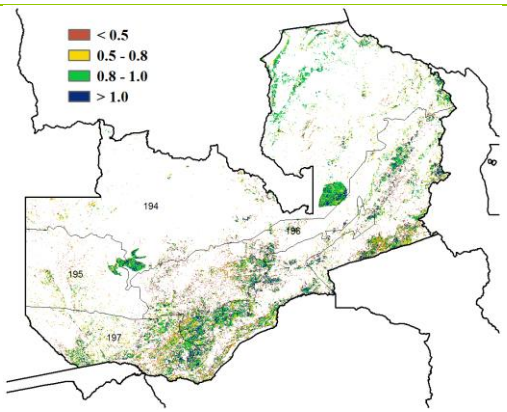
**Figure 3.45. Zambia's crop condition, July -October 2018**



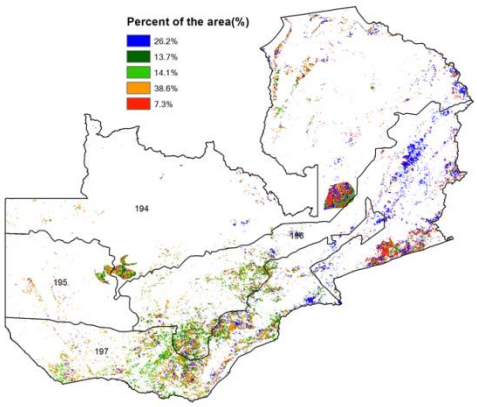

a). Phenology of major crops



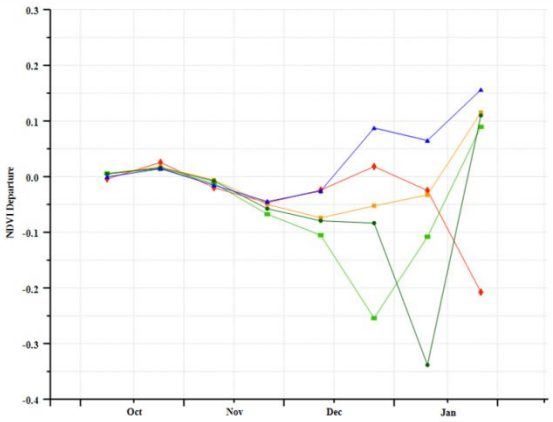

(b) Crop condition development graph based on NDVI




(c) Maximum VCI




(d) Spatial NDVI patterns compared to 5YA




(e) NDVI profiles