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Contents

| • NOTE: CROPWATCH RESOURCES, BACKGROUND MATERIALS AND ADDITIONAL DATA ARE AVAILABLE ONLINE AT WWW.CROPWATCH.COM.CN. | | |
|---|-----------------|--|
| CONTENTS | I | |
| LIST OF TABLES | II | |
| LIST OF FIGURES | VIII | |
| ABBREVIATIONS | XI | |
| BULLETIN OVERVIEW AND REPORTING PERIOD | XII | |
| EXECUTIVE SUMMARY | | |
| CHAPTER 1. GLOBAL AGROCLIMATIC PATTERNS | | |
| 1.1 INTRODUCTION TO CROPWATCH AGROCLIMATIC INDICATORS (CWAIS) | | |
| 1.2 GLOBAL OVERVIEW | | |
| 1.3 RAINFALL | | |
| 1.4 TEMPERATURES | | |
| 1.5 RADPAR | 6 7 | |
| CHAPTER 2 CROP AND ENVIRONMENTAL CONDITIONS IN MA | | |
| 2.1 OVERVIEW | | |
| 2.2 West Africa | 9 | |
| 2.3 North America | | |
| 2.4 South America | | |
| 2.5 South and Southeast Asia | | |
| | | |
| 2.7 CENTRAL EUROPE TO WESTERN RUSSIA | | |
| CHAPTER 3. CORE COUNTRIES | | |
| 3.1 OVERVIEW | | |
| | | |
| | | |
| 4.1 OVERVIEW | | |
| 4.3 MAJOR CROPS TRADE PROSPECTS | | |
| CHAPTER 5. FOCUS AND PERSPECTIVES | | |
| 5.1 CROPWATCH FOOD PRODUCTION ESTIMATES | | |
| 5.2 DISASTER EVENTS | | |
| 5.3 Update on El Niño | 193 | |
| ANNEX A. AGROCLIMATIC INDICATORS AND BIOMSS | | |
| ANNEX B. QUICK REFERENCE TO CROPWATCH INDICATORS, SF | ATIAL UNITS AND | |
| METHODOLOGIES | | |
| DATA NOTES AND BIBLIOGRAPHY | 213 | |
| ACKNOWLEDGMENTS | | |
| ONLINE RESOURCES | | |

LIST OF TABLES

| TABLE 2.1 AGROCLIMATIC INDICATORS BY MAJOR PRODUCTION ZONE, CURRENT |
|--|
| VALUE AND DEPARTURE FROM 15YA (OCTOBER 2021-JANUARY 2022) |
| TABLE 2.2 AGRONOMIC INDICATORS BY MAJOR PRODUCTION ZONE, CURRENT SEASON |
| VALUES AND DEPARTURE FROM 5YA (OCTOBER 2021-JANUARY 2022)9 |
| |
| TABLE 3.1 OCTOBER 2021 – JANUARY 2022 AGRO-CLIMATIC AND AGRONOMIC |
| INDICATORS BY COUNTRY, CURRENT VALUE AND DEPARTURE FROM AVERAGE 24 |
| TABLE 3.2 AFGHANISTAN'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.3 AFGHANISTAN'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.4 ANGOLAS'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.5 ANGOLAS'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.6 ARGENTINA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.7 ARGENTINA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.8 AUSTRALIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.9 AUSTRALIA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.10 BANGLADESH'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER- JANUARY |
| 2022 |
| TABLE 3.11 BANGLADESH'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER- JANUARY |
| |
| TABLE 3.12 BELARUS'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021- |
| |
| TABLE 3.13 BELARUS 'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
| SEASON'S VALUES AND DEPARTURE FROM SYA, OCTOBER 2021- JANUARY 20224/ |
| TABLE 3.14 BRAZIL'S AGROULIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
| SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – JANUARY 202252 |

TABLE 3.15 BRAZIL'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 OCTOBER 2021 -TABLE 3.16 CANADA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 -TABLE 3.17 CANADA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 -TABLE 3.18 GERMANY'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021-TABLE 3.19 GERMANY'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021-JANUARY TABLE 3.20 EGYPT'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT season's values, and departure from 15ya, october 2021 - January 202263 TABLE 3.21 EGYPT'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES, AND DEPARTURE FROM 5YA, OCTOBER 2021 - JANUARY 2022.63 TABLE 3.22 ETHIOPIA'S AGROCLIMATIC INDICATORS BY SUB - NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021-TABLE 3.23 ETHIOPIA'S AGRONOMIC INDICATORS BY SUB - NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA. OCTOBER 2021-JANUARY TABLE 3.24 FRANCE'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 -TABLE 3.25 FRANCE'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT season's values and departure from 5ya. October 2021 – January 2022.70 TABLE 3.26 UNITED KINGDOM'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – JANUARY 202273 TABLE 3.27 UNITED KINGDOM'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 -TABLE 3.28 HUNGARY'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021-TABLE 3.29 HUNGARY'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021-JANUARY TABLE 3.30 INDONESIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – JANUARY 202280 TABLE 3.31 INDONESIA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 -

TABLE 3.32 INDIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – JANUARY 2022 TABLE 3.33 INDIA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – JANUARY 2022.84 TABLE 3.34 IRAN'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021-JANUARY 2022 ...87 TABLE 3.35 IRAN'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021-JANUARY 202287 TABLE 3.36 ITALY'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021-JANUARY 2022..90 TABLE 3.37 ITALY'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021-JANUARY 2022....90 TABLE 3.38 KAZAKHSTAN AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – JANUARY 202292 TABLE 3.39 KAZAKHSTAN, AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT TABLE 3.40 KENYA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021-JANUARY TABLE 3.41 KENYA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE, OCTOBER 2021-JANUARY 2022......96 TABLE 3.42 KYRGYZSTAN AGRO-CLIMATIC INDICATORS, CURRENT SEASON'S VALUES TABLE 3.43. KYRGYZSTAN AGRONOMIC INDICATORS, CURRENT SEASON'S VALUES AND TABLE 3.44 CAMBODIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 -TABLE 3.45 CAMBODIA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 -TABLE 3.46 SRI LANKA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 -TABLE 3.47 SRI LANKA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 -TABLE 3.48 MOROCCO'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES, AND DEPARTURE FROM 15YA, OCTOBER 2021 -TABLE 3.49 MOROCCO'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS. CURRENT SEASON'S VALUES, AND DEPARTURE FROM 5YA, OCTOBER 2021 -TABLE 3.50 MEXICO'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 -

| TABLE 3.51 MEXICO'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
|--|
| SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – JANUARY 2022 |
| |
| TABLE 3.52 MYANMAR'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
| JANUARY 2022 115 |
| TABLE 3.53 MYANMAR'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.54 MONGOLIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES, AND DEPARTURE FROM TSYA, OCTOBER 2021 - |
| |
| TABLE 3.55 MONGOLIA'S AGRONOMIC INDICATORS BY SUB-INATIONAL REGIONS, |
| CURRENT SEASON'S VALUES, AND DEPARTURE FROM STA, OCTOBER 2021 - |
| |
| CURRENT SEASON'S VALUES AND DEPARTURE EPONA 15YA OCTORED 2021 |
| LANUARY 2022 |
| |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA OCTOBER 2021 - |
| IANIJARY 2022 |
| TABLE 3 58 NIGERIA'S AGRO-CUMATIC INDICATORS BY SUB-NATIONAL REGIONS |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.59 NIGERIA'S AGRONOMIC INDICATORS BY SUB-REGIONS, CURRENT SEASON'S |
| VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 - JANUARY 2022 |
| TABLE 3.60 PAKISTAN'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021- |
| JANUARY 2022 |
| TABLE 3.61 PAKISTAN'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021- |
| JANUARY 2022 131 |
| TABLE 3.62 PHILIPPINES' AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.63 PHILIPPINES' AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 - |
| JANUARY 2022 135 |
| TABLE 3.64 POLAND'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.65 POLAND'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
| SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 - JANUARY 2022138 |
| TABLE 3.66 ROMANIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15TA, OCTOBER 2021 - |
| |
| CUPPENT SEASONI'S VALUES AND DEDADTIDE EDOMASYA OCTORED 2021 |
| LANUARY 2022 |
| J7 11 YO7 11(1 ZOZZ |

| TABLE 3.68 RUSSIA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
|--|
| JANUARY 2022 |
| TABLE 3.69 RUSSIA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
| SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – JANUARY 2022 |
| TABLE 3.70 THAILAND'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.71 THAILAND'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| IANUARY 2022 |
| TABLE 3.72 TURKEY'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.73 TURKEY'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
| SLASON 3 VALUES AND DELAKTORE FROM STA, OCTOBER 2021 – JANOART 2022 |
| TABLE 3.74 UKRAINE'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.75 UKRAINE'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT |
| TABLE 3.76 UNITED STATES AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.77 AFGHANISTAN'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, |
| JANUARY 2022 |
| TABLE 3.78 UZBEKISTAN'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES, AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.79 UZBERISTAN'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES, AND DEPARTURE FROM 5YA, OCTOBER 2021 - |
| JANUARY 2022 |
| TABLE 3.80 VIETNAM'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 - |
| JANUARY 2022 |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA. OCTOBER 2021 – |
| JANUARY 2022 |
| TABLE 3.82 SOUTH AFRICA'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
| IG9 TABLE 3 83 SOLITH AFRICA'S AGRONOMIC INDICATORS BY SUB-NATIONAL REGIONS |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021 – |
| JANUARY 2022 |

| TABLE 3.84 COUNTRY'S AGROCLIMATIC INDICATORS BY SUB-NATIONAL REGIONS, CURRENT SEASON'S VALUES AND DEPARTURE FROM 15YA, OCTOBER 2021 – |
|--|
| JANUARY 2022 172 |
| TABLE 3.85 COUNTRY'S AGRONOMIC INDICATORS BY SUB - NATIONAL REGIONS, |
| CURRENT SEASON'S VALUES AND DEPARTURE FROM 5YA, OCTOBER 2021- |
| JANUARY 2022 172 |
| TABLE 4.1 CROPWATCH AGROCLIMATIC AND AGRONOMIC INDICATORS FOR CHINA, |
| OCTOBER 2021 – JANUARY 2022, DEPARTURE FROM 5YA AND 15YA 174 |
| TABLE 5.1 2022 CEREAL AND SOYBEAN PRODUCTION ESTIMATES IN THOUSAND TONNES. |
| Δ IS THE PERCENTAGE OF CHANGE OF 2022 PRODUCTION WHEN COMPARED WITH |
| |
| TABLE A.1 OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS AND BIOMASS |
| BY GLOBAL MONITORING AND REPORTING UNIT (MRU) 196 |
| TABLE A.2 OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS AND BIOMASS |
| BY COUNTRY |
| TABLE A.3 ARGENTINA, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS |
| TABLE A 4 AUSTRALIA OCTOBER 2021 – JANUARY 2022 AGROCUMATIC INDICATORS |
| AND BIOMASS (BY STATE) |
| TABLE A.5 BRAZIL, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS AND |
| BIOMASS (BY STATE) |
| TABLE A.6 CANADA, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS |
| AND BIOMASS (BY PROVINCE) |
| TABLE A.7 INDIA, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS AND |
| BIOMASS (BY STATE) |
| TABLE A.8 KAZAKHSTAN, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS |
| |
| BIOMASS (BY OBLAST, KRAY AND REPUBLIC) |
| TABLE A.10 UNITED STATES, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC |
| INDICATORS AND BIOMASS (BY STATE) |
| TABLE A.11 CHINA, OCTOBER 2021 – JANUARY 2022 AGROCLIMATIC INDICATORS AND |
| BIOMASS (BY PROVINCE) |
| |

LIST OF FIGURES

| FIGURE 1.1 GLOBAL DEPARTURE FROM RECENT 15-YEAR AVERAGE OF THE RAIN, TEMP |
|---|
| AND RADPAR INDICATORS. THE LAST PERIOD COVERS OCTOBER 2021 TO JANUARY |
| (ONDJ) 2022 (AVERAGE OF 65 MRUS, UNWEIGHTED)5 |
| FIGURE 1.2 GLOBAL MAP OF RAINFALL ANOMALY (AS INDICATED BY THE RAIN |
| INDICATOR) BY CROPWATCH MAPPING AND REPORTING UNIT: DEPARTURE OF |
| OCTOBER 2021 TO JANUARY 2022 TOTAL FROM 2007-2021 AVERAGE (15YA), IN |
| PERCENT |
| FIGURE 1.3 GLOBAL MAP OF TEMPERATURE ANOMALY (AS INDICATED BY THE TEMP |
| INDICATOR) BY CROPWATCH MAPPING AND REPORTING UNIT: DEPARTURE OF |
| OCTOBER 2021 TO JANUARY 2022 AVERAGE FROM 2007-2021 AVERAGE (15YA), |
| IN °C6 |
| FIGURE 1.4 GLOBAL MAP OF PHOTOSYNTHETICALLY ACTIVE RADIATION ANOMALY (AS |
| INDICATED BY THE RADPAR INDICATOR) BY CROPWATCH MAPPING AND |
| REPORTING UNIT: DEPARTURE OF OCTOBER 2021 TO JANUARY 2022 TOTAL FROM |
| 2007-2021 AVERAGE (15YA), IN PERCENT6 |
| FIGURE 1.5 GLOBAL MAP OF BIOMASS ACCUMULATION (AS INDICATED BY THE BIOMSS |
| INDICATOR) BY CROPWATCH MAPPING AND REPORTING UNIT: DEPARTURE OF |
| OCTOBER 2021 TO JANUARY 2022 TOTAL FROM 2007-2021 AVERAGE (15YA), IN |
| PERCENT7 |
| |
| FIGURE 2.1 WEST AFRICA MPZ: AGROCLIMATIC AND AGRONOMIC INDICATORS, |
| OCIOBER 2021 - JANUARY 2022. |
| FIGURE 2.2 WEST AFRICA MPZ: AGROCLIMATIC AND AGRONOMIC INDICATORS, |
| OCTOBER 2021-JANUARY 202210 |
| FIGURE 2.3 SOUTH AMERICA MPZ: AGROCLIMATIC AND AGRONOMIC INDICATORS, |
| OCIOBER 2021 IO JANUARY 2022 |
| HGURE 2.4 SOUTH AND SOUTHEAST MPZ: AGROCLIMATIC AND AGRONOMIC |
| INDICATORS, OCTOBER 2021-JANUARY 2022 |
| HOURE 2.5 WESTERN EUROPE MPZ: AGROCLIMATIC AND AGRONOMIC INDICATORS, |
| OCIOBER 2021-JANUARY 2022. |
| HGURE 2.6 CENTRAL EUROPE-WESTERN RUSSIA MPZ: AGROCLIMATIC AND |
| AGRONOMIC INDICATORS, OCTOBER 2021-JANUARY 202219 |
| FIGURE 3.1 NATIONAL AND SUBNATIONAL RAINEAU ANOMALY (AS INDICATED BY THE |
| RAIN INDICATOR) OF OCTOBER 2021- JANUARY 2022 TOTAL RELATIVE TO THE 2007- |
| 2021 AVERAGE (15YA) IN PERCENT |
| FIGURE 3.2 NATIONAL AND SUBNATIONAL TEMPERATURE ANOMALY (AS INDICATED BY |
| THE TEMP INDICATOR) OF OCTOBER 2021-JANUARY 2022 AVERAGE RELATIVE TO |
| THE 2007-2021 AVERAGE (15YA). IN °C. |
| FIGURE 3.3 NATIONAL AND SUBNATIONAL SUNSHINE ANOMALY (AS INDICATED BY THE |
| RADPAR INDICATOR) OF OCTOBER 2021- IANUARY 2022 TOTAL RELATIVE TO THE |
| 2007-2021 AVERAGE (15YA). IN PERCENT 23 |
| |

FIGURE 3.4 NATIONAL AND SUBNATIONAL BIOMASS PRODUCTION POTENTIAL

ANOMALY (AS INDICATED BY THE BIOMSS INDICATOR) OF OCTOBER 2021-

JANUARY 2022 TOTAL RELATIVE TO THE 2007-2021 AVERAGE (15YA), IN PERCENT...24 FIGURE 3.5 AFGHANISTAN'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022........26 FIGURE 3.10 BELARUS'S CROP CONDITION, OCTOBER 2021- JANUARY 2022......45 FIGURE 3.12 CANADA'S CROP CONDITION, OCTOBER 2021 – JANUARY 202254 FIGURE 3.13 GERMANY'S CROP CONDITION, OCTOBER 2021-JANUARY 202258 FIGURE 3.15 ETHIOPIA'S CROP CONDITION, OCTOBER 2021-JANUARY 2022......64 FIGURE 3.17 UNITED KINGDOM'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022.71 FIGURE 3.23 KAZAKHSTAN'S CROP CONDITION, OCTOBER 2021 – JANUARY 202291 FIGURE 3.24 KENYA'S CROP CONDITION, OCTOBER 2021-JANUARY 202295 FIGURE 3.25 KYRGYZSTAN'S CROP CONDITION, OCTOBER 2021 TO JANUARY 202297 FIGURE 3.26 CAMBODIA'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 100 FIGURE 3.27 SRI LANKA'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 103 FIGURE 3.28 MOROCCO'S CROP CONDITION, OCTOBER 2021 - JANUARY 2022 106 FIGURE 3.29 MEXICO'S CROP CONDITION, OCTOBER 2021 - JANUARY 2022 110 FIGURE 3.30 MYANMAR'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022........... 113 FIGURE 3.31 MONGOLIA'S CROP CONDITION, OCTOBER 2021 - JANUARY 2022...... 116 FIGURE 3.32. MOZAMBIQUE'S CROP CONDITION, OCTOBER 2021-JANUARY 2022..... 120 FIGURE 3.33 NIGERIA'S CROP CONDITION, OCTOBER 2021 - JANUARY 2022..... 124 FIGURE 3.34 PAKISTAN CROP CONDITION, OCTOBER 2021 - JANUARY 2022 129 FIGURE 3.35 PHILIPPINES' CROP CONDITION, OCTOBER 2021 – JANUARY 2022 133 FIGURE 3.36 POLAND'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 136 FIGURE 3.37 ROMANIA'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 139 FIGURE 3.38 RUSSIA'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 144 FIGURE 3.39 THAILAND'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022...... 148 FIGURE 3.40 TURKEY'S CROP CONDITION, OCTOBER 2021 - JANUARY 2022 150 FIGURE 3.41 UKRAINE'S CROP CONDITION, OCTOBER 2021 - JANUARY 2022...... 153 FIGURE 3.42 UNITED STATES CROP CONDITION, OCTOBER 2021 – JANUARY 2022 157 FIGURE 3.43 UZBEKISTAN CROP CONDITION, OCTOBER 2021 - JANUARY 2022.....160 FIGURE 3.44 VIETNAM'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 164 FIGURE 3.45 SOUTH AFRICA'S CROP CONDITION, OCTOBER 2021 – JANUARY 2022 ... 167 FIGURE 3.46 ZAMBIA CROP CONDITION, OCTOBER 2021 - JANUARY 2022 170

| FIGURE 4.3 CHINA SPATIAL DISTRIBUTION OF TEMPERATURE PROFILES, OCT 2021 TO JAN 2022 |
|--|
| FIGURE 4.4 CHINA MAXIMUM VEGETATION CONDITION INDEX (VCIX), BY PIXEL, OCT 2021 TO JAN 2022 |
| FIGURE 4.5 CHINA BIOMASS DEPARTURE MAP FROM 15YA, BY PIXEL, OCT 2021 TO JAN 2022 |
| FIGURE 4.6 CROP CONDITION CHINA NORTHEAST REGION, OCTOBER 2021 – JANUARY 2022 |
| FIGURE 4.7 CROP CONDITION INNER MONGOLIA, OCTOBER 2021 – JANUARY 2022., 177 |
| FIGURE 4.8 CROP CONDITION CHINA HUANGHUAIHAI, OCTOBER 2021 – JANUARY 2022 |
| FIGURE 4.9 CROP CONDITION CHINA LOESS REGION, OCTOBER 2021 – JANUARY 2022 |
| FIGURE 4.10 CROP CONDITION CHINA LOWER YANGTZE REGION, OCTOBER 2021 – |
| FIGURE 4.11 CROP CONDITION CHINA SOUTHWEST REGION, OCTOBER 2021 – |
| FIGURE 4.12 CROP CONDITION SOUTHERN CHINA REGION, OCTOBER 2021 – JANUARY |
| FIGURE 4.13 RATE OF CHANGE OF IMPORTS AND EXPORTS FOR RICE, WHEAT, MAIZE, AND SOYBEAN IN CHINA IN 2022 (%) |
| FIGURE 5.1 IMPACT OF TROPICAL STORM ANA ON SIX MOZAMBICAN PROVINCES INCLUDES NAMPULA, ZAMBEZI, TETE, NIASSA, SOFALA, AND MANICA. DATA AS OF FEBRUARY 8TH, 2022 |
| 2022 (RIGHT). (SOURCE: U.S. DROUGHT MONITOR) |
| |
| FIGURE 5.5 THE FERTILIZER CRISIS IS GETTING REAL FOR FUROPE FOOD PRICES, BY YULLY A |
| |
| WHEAT HITS NINE-YEAR HIGH ON SUPPLY FEARS BY MEGAN DURISIN AND ALLISON |
| NICOLE SMITH FERRILARY 23, 2022 (MIDDLE), SOVREANS SOAR TO 8 YEAR HIGH |
| |
| WITH SOUTH AMERICA SUFFLITIN DOUBT, BT NIM CHIFMAN AND MEGAN DURISIN, |
| |
| AS OBSERVED BY FAO |
| (https://www.fao.org/ag/locusts/common/ecg/1914/en/dl517e.pdf).192 |
| FIGURE 5.7 MONTHLY SOI-BOM TIME SERIES FROM JANUARY 2021 TO JANUARY 2022 194 |
| FIGURE 5.8 MAP OF NINO REGION |
| FIGURE 5.9 MONTHLY TEMPERATURE ANOMALIES IN THE TROPICAL PACIFIC FOR |
| JANUARY 2022 |

Abbreviations

| 5YA | Five-year average, the average for the four-month period from October of the previous year to January of the current year for 2017-2021; one of the standard reference periods |
|------------------|---|
| 15YA | Fifteen-year average, the average for the four-month period from October of the previous year to January of the current year for 2007-2021; one of the standard reference periods and typically referred to as "average". |
| AEZ | Agro-Ecological Zone |
| BIOMSS | CropWatch agroclimatic indicator for biomass production potential |
| BOM | Australian Bureau of Meteorology |
| CALF | Cropped Arable Land Fraction |
| CAS | Chinese Academy of Sciences |
| CWAI | CropWatch Agroclimatic Indicator |
| CWSU | CropWatch Spatial Units |
| DM | Dry matter |
| EC/JRC | European Commission Joint Research Centre |
| ENSO | El Niño Southern Oscillation |
| FAO | Food and Agriculture Organization of the United Nations |
| GAUL | Global Administrative Units Layer |
| GVG | GPS, Video, and GIS data |
| На | hectare |
| Kcal | kilocalorie |
| MPZ | Major Production Zone |
| MRU | Mapping and Reporting Unit |
| NDVI | Normalized Difference Vegetation Index |
| OISST | Optimum Interpolation Sea Surface Temperature |
| PAR | Photosynthetically active radiation |
| PET | Potential Evapotranspiration |
| AIR | CAS Aerospace Information Research Institute |
| RADPAR | CropWatch PAR agroclimatic indicator |
| RAIN | CropWatch rainfall agroclimatic indicator |
| SOI | Southern Oscillation Index |
| TEMP | CropWatch air temperature agroclimatic indicator |
| Tonne | Thousand kilograms |
| VCIx | CropWatch maximum Vegetation Condition Index |
| VHI | CropWatch Vegetation Health Index |
| VHIn | CropWatch minimum Vegetation Health Index |
| W/m ² | Watt per square meter |

Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between October 2021 and January 2022, a period referred to in this bulletin as the ONDJ (October, November, December and January) period or just the "reporting period." The bulletin is the 124th such publication issued by the CropWatch group at the Aerospace Information Research Institute (AIR) of the Chinese Academy of Sciences, Beijing.

CropWatch indicators

CropWatch analyses are based mostly on several standard as well as new ground-based and remote sensing indicators, following a hierarchical approach.

In parallel to an increasing spatial precision of the analyses, indicators become more focused on agriculture as the analyses zoom in to smaller spatial units. CropWatch uses two sets of indicators: (i) agroclimatic indicators—RAIN, TEMP, RADPAR, and potential BIOMSS, which describe weather factors and its impacts on crops. Importantly, the indicators RAIN, TEMP, RADPAR, and BIOMSS do not directly describe the weather variables rain, temperature, radiation, or biomass, but rather they are spatial averages over agricultural areas, which are weighted according to the local crop production potential; and (ii) agronomic indicators—VHIn, CALF, and VCIx and vegetation indices, describing crop condition and development. (iii) PAY indicators: planted area, yield and production.

For each reporting period, the bulletin reports on the departures for all seven indicators, which (with the exception of TEMP) are expressed in relative terms as a percentage change compared to the average value for that indicator for the last five or fifteen years (depending on the indicator).For more details on the CropWatch indicators and spatial units used for the analysis, please see the quick reference guide in Annex B, as well as online resources and publications posted at www.cropwatch.cn.

CropWatch analysis and indicators

The analyses cover large global zones; major producing countries of maize, rice, wheat, and soybean; and detailed assessments for Chinese regions, 42 major agricultural countries, and 217 Agro-Ecological Zones (AEZs).

| Chapter | Spatial coverage | Key indicators |
|-----------|--|---|
| Chapter 1 | World, using Mapping and Reporting Units (MRU), 65 large, agro-ecologically homogeneous units covering the globe | RAIN, TEMP, RADPAR, BIOMSS |
| Chapter 2 | Major Production Zones (MPZ), six regions that contribute most to global food production | As above, plus CALF, VCIx, and VHIn |
| Chapter 3 | 42 key countries (main producers and exporters) and 210 AEZs | As above plus NDVI and GVG survey |
| Chapter 4 | China and regions | As above plus high-resolution images; Pest and crops trade prospects |
| Chapter 5 | Production outlook, and updates on disaster events and El Niño. | |
| | | |

This bulletin is organized as follows:

Regular updates and online resources

The bulletin is released quarterly in both English and Chinese. E-mail **cropwatch@radi.ac.cn** to sign up for the mailing list or visit CropWatch online at **www.cropwatch.cn**, **http://cloud.cropwatch.cn/**

Executive summary

The current CropWatch bulletin describes world-wide crop condition and food production as appraised by data up to the end of January 2022. It is prepared by an international team coordinated by the Aerospace Information Research Institute, Chinese Academy of Sciences.

The assessment is based mainly on remotely sensed data. It covers prevailing weather conditions, including extreme factors, at different spatial scales, starting with global patterns in Chapter 1. Chapter 2 focuses on agro-climatic and agronomic conditions in major production zones in all continents. Chapter 3 covers the major agricultural countries that, together, make up at least 80% of production and exports (the "core countries") while chapter 4 zooms into China. Special attention is paid to the production outlook of major cereal and oil crops (maize, rice, wheat and soybean) countries in the Southern Hemisphere and some tropical and sub-tropical countries. Subsequent sections of Chapter 5 describe the global disasters that occurred from October 2021 to January 2022.

This bulletin covers the beginning of the rainy season in the Southern Hemisphere, as well as the sowing period and early vegetative growth of (winter) wheat in the Northern Hemisphere.

Agro-climatic conditions

Global temperatures continued their upward trend in 2021. It was slightly slowed by La Niña, which is expected to last until April 2022. Nevertheless, 2021 was the sixth warmest year on record. Temperatures were 0.84°C above the average of the 20th century. In Brazil, deforestation, fueled by high prices for soybean, maize and beef intensified even more in 2021. It had hit the highest point in the last 15 years. A new study found that a warmer, dryer environment already has pushed 28% of Amazonian agricultural space out of its optimum climate conditions. The research predicted that 51% of the region's agricultural land would move out of its ideal climate by 2030.

As expected, La Niña had a negative effect on precipitation in the south of Brazil and Paraguay and eastern Africa. However, other regions were also plagued by drought as well, such as the Maghreb and Morocco in particular. That country is experiencing the most severe drought conditions of the last 30 years. Heavy rainfall in January brought some relief to Central Asia and especially Afghanistan, which had suffered from a prolonged drought. Most of Africa south of the Sahara received below average rainfall. The monsoon rains north of the equator stopped earlier than normal and in the south, they started with a delay. This has caused drought conditions in northern Zimbabwe, Mozambique, Zambia, Malawi, Tanzania and Madagascar. The southern Plains, an important winter wheat production region of the USA encompassing Texas, Oklahoma and Kansas has experienced moderate to extreme drought conditions starting last fall. Rainfall was below average for most of Europe in October and early November, when precipitation returned to average levels for Central and Eastern Europe. Rainfall was near average for the important rice production countries in Southeast Asia. It was more abundant than usual in regions along the Yellow River in China. It caused localized flooding, which in turn delayed sowing of winter wheat. Above average rainfall, which is attributed to La Niña, provided favorable conditions for wheat production in Australia.

2 | CropWatch Bulletin, February 2022

Key findings of this report

Maize: Favorable weather conditions helped ensure good harvest conditions in the USA and Europe. The drought in the south of Brazil is impacting its maize production, causing a drop by 5%. Conditions have been favorable in Argentina, CropWatch estimates an increase in production by 9% in Argentina. Africa south of the equator: Sowing was impacted by a delay in the onset of the monsoon season. Below average rainfall is causing drought conditions and yield losses. Conditions are favorable for winter maize production in south and south-east Asia.

Rice: Conditions during the monsoon season were favorable in South and Southeast Asia, thus harvest conditions were favorable. The combined output from the 12 countries monitored by CropWatch, accounting for 36% global rice production, is expected to increase by 1.5%.

Wheat: Conditions for wheat production in the Southern Hemisphere were generally favorable, apart from Brazil, which suffered from drought conditions. Argentina, South Africa and Australia benefitted from above average rainfall which resulted in record yield levels. Winter wheat was off to a slow start in Europe and Turkey, but conditions returned to average starting in mid-November. Winter wheat in the southern Plains of the USA is impacted by drought conditions. Sowing was delayed in regions along the Yellow River in China due to abnormally high rainfall in the autumn. Overall, global wheat production is projected to drop by 2% from 2021.

Soybean: Conditions are mixed in Brazil: Favorable in Mato Grosso, while the south of Brazil and Paraguay are impacted by drought conditions. Conditions in Argentina are favorable. CropWatch estimates an increase in production by 1% in Brazil and 4% in Argentina over the last year.