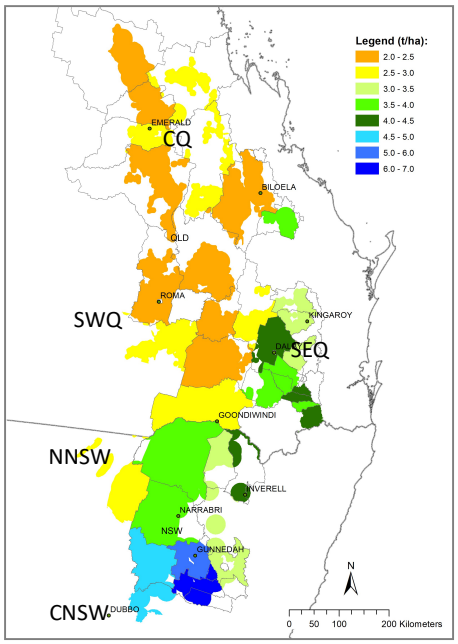
SEASONAL CROP OUTLOOK

Sorghum: February 2020

SUMMARY

With the summer cropping season nearing completion, the chances for an above average yielding sorghum crop for the 2019/20 summer growing season in north-eastern Australia (NEAUS) have further diminished for most parts of the cropping region. Although some variability exists, almost all regions have a below average crop expectation with predicted yield outcomes below to well below the long-term expectation. The exception is for parts of CQ, which has a predicted yield medians close to the long-term expectation. With the sowing window now closed, except for some parts of CQ, above average rainfall is needed during the next couple of weeks to ensure late summer crop plantings, specifically in CQ. Prelimanary estimates of area planted to sorghum (dry land) are extremely low at around 13000 ha for NEAUS summer crop region. This crop outlook is based on a crop-free (short fallow) practice through the winter season and therefore areas with longer fallow practices are likely to have better yield prospects.



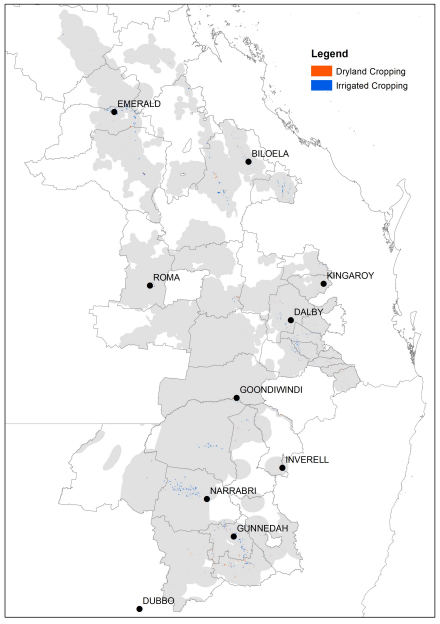
Map 1: Simulated long-term median shire yield derived from 1901 to 2019 using 2019 technology.

GENERAL CONDITIONS

Although average to above average rainfall recorded during January, it was variable and scattered in some regions. This resulted in some extremely late plantings to summer crops, especially to the latter part of January and mainly in parts of SEQ. However, the protracted dry period leading up to sowing and the below average rainfall during sowing period resulted in few opportunities for sowing of summer crops within September to end of December planting window. Furthermore, rainfall during the last 6-months was very much below average across most of the NEAUS cropping region. For most parts of southern QLD and NNSW rainfall recorded ranked in the lowest on record compared to all years. Preliminary estimates of dry land summer & irrigated summer crops planted, up to end of December, are around 13,000 ha (most likely sorghum) & 39,000 ha (most likely cotton or other crops), respectively. With the traditional planting window now closed in most parts of the southern cropping regions, very late plantings remains risky in most regions due to the extremely low soil moisture profiles and increased likelihood of pest, disease, and frost occurrences. Widespread above average rainfall is needed over the next month to induce planting opportunities, specifically in CQ where late plantings can occur until mid-February. The recent pattern of the SOI, i.e. "rapidly rising", at the end of January indicates a slightly reduced chance of receiving above average rainfall for most of the summer grains cropping region over the next 3-months (www.longpaddock.qld.gov.au). Note: this outlook is only applicable to a winter fallow period (~7-month period).

OUTLOOK

The benchmark for this outlook is the simulated long-term median shire sorghum yield within the broad NEAUS cropping region (Map 1). The median yield is based on predicted performance over the past 119-years using an agro-climatic model for sorghum with long-term rainfall records (see descriptive note for more details). Map 2 shows the likely area planted to summer crops during the current season based on green-up metrics using Sentinel-2 imagery. The percentage departure (deviation) of the forecast median (DFY) for this season from the long-term median shire sorghum yield is given in Map 3. Any areas coloured in light grey, yellow or red have a poor to very poor likelihood of having crops above the long-term median yield, whereas areas coloured in dark grey, green or blue have moderate to high chances of producing higher yielding crops. Map 3 is derived by considering conditions up to date and projecting forward based on rainfall conditions in years with SOI phase similar to this year i.e. "rapidly falling" at the end of January period. The calculation of benchmark

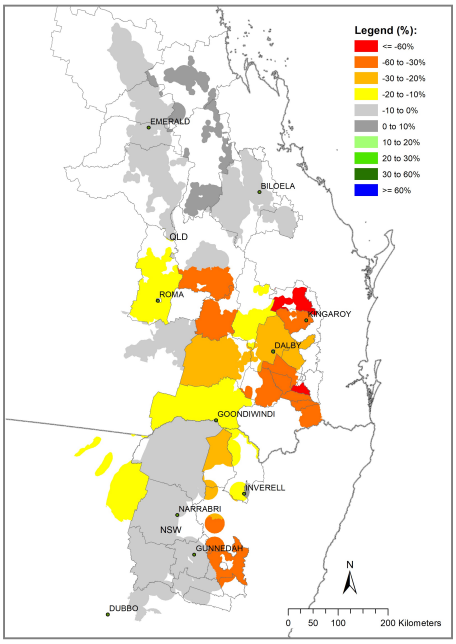


Map 2: Likely summer cropping areas for dry land & irrigated cropping during the 2019/2020 season. Using Sentinel-2 satellite imagery (10m x 10m pixel size). Red and Blue depicts dry land and irrigated areas, respectively. For more detail, please email a.potgieter@uq.edu.au.

yields and outlook chances do not take into account effects of poor crop nutrition or damage due to pests, diseases, frosts, or extreme events (e.g. heat waves).

Almost all regions are showing expected yield outcomes to be below to very much below (-60% to -10%) the long-term median expectation for that region. However, some variation exist across most of the NEAUS summer cropping region (Map 3). Specifically, most areas in eastern southern QLD have forecast yield deviations very much below the long-term median expectation for that region (-20% to < -60%). The exception is for parts of CQ and NNSW (including CNSW) that have yield outcomes below the long-term median expectation (0 - 20%) from the long-term median yield. Furthermore, almost all yield outcomes in NEAUS' cropping region are extremely low and falling below the 20th percentile compared to all seasons over the last 119 years. The worst affected region is SEQ, which has predicted yield outcomes ranked below the 5th percentile. Conversely, yield outcomes in CQ are close to the 30th percentile range relative to all years (Map 3).

Note: Final summer crop yield is usually more affected by in-crop rainfall and temperatures (during crop growth) than by the soil moisture at sowing, although this remains an important factor.



Map 3: Percentage departure of the current forecast median shire yield from the long-term shire median yield.

Poor Crop Chance

At present, most parts of southern QLD and NSW have a moderately increased chance for sorghum crop yield (if planted) to fall below the bottom 10th percentile yield of all years (data not shown). It should be noted that these values are calculated as broad indicators for shire scale and do not apply to farm level.

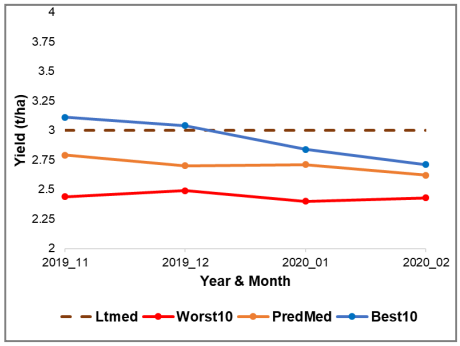
Regional Outlook

The current regional outlook shows the forecast median yield for the entire NEAUS sorghum-cropping region on the 1st February is 2.62 t/ha (7th percentile), which is below the long-term median of 3 t/ha (Graph A). There is however, a 10% chance that the state yield could be lower than 2.43 t/ha, or higher than 2.71 t/ha. At local regional level, Queensland (QLD), central Qld (CQ), southwest QLD (SWQ), southeast Qld (SEQ) and northern NSW (NNSW) (Map 1), the forecast yield (t/ha) ranges are as follows:

Region	Predicted Median (50%)	DFY (%)	Percentile (%)	Long-term Median
SEQ	2.37	-35	2nd	3.61
CQ	2.20	-9	30th	2.41
SWQ	2.00	-14	15th	2.33
QLD	2.19	-19	7th	2.72
NNSW	3.23	-9	17th	3.56

**DFY is the percentage departure of the forecast shire median yield from the long-term shire median wheat yield.*

With the summer cropping season approaching harvest, all of NEAUS cropping regions are having yield expectations below to well below the long-term regional sorghum yield expectation (ranked below 20th percentile relative to all years). The exception is for parts of CQ with yield outcomes moderately below (30th percentile) the long-term expectation. The range of possible outcomes has narrowed considerably and most of the predicted yield distribution is below the long-term median across all regions. The current SOI phase of "rapidly rising" indicates reduced chances to receive above average rainfall in most parts of NEAUS summer cropping region over the next 3-months. Widespread above average rainfall is critical over the next month to recharge soil profiles and induce further late planting opportunities across the entire region. However, with the traditional sowing window now closed in southern regions and with the extremely low soil profiles, late sowings are highly unlikely in those regions. However, given above average rainfall and optimum management, parts of CQ can plant sorghum during middle February.



Graph A: State level yield forecast trajectories (10th, 50th and 90th percentiles).

Descriptive Note:

The seasonal sorghum outlook is based on the integration of (i) a simple agro-climatic sorghum stress index model, (ii) actual climate data up to the forecasting date and (iii) projected climate data after that date. The stress index is sensitive to water deficit or excess during the growing season (Ritchie, 1972; Fitzpatrick and Nix, 1969; Nix and Fitzpatrick, 1969). These projected data are created from historical analogue years based on similarity to the prevailing phase of the Southern Oscillation Index (SOI) (Stone et al., 1996). The sorghum model was ran from 1 April the year before harvest in order to account for the influence of the winter fallow on starting soil moisture conditions. The model shire input parameters (i.e. plant available water content, planting rain & stress index period) have been selected based on the best fit when calibrated against actual shire sorghum yields from the Australian Bureau of Statistics (ABS) census years for the period 1983 to 2000, 2006, 2011, & 2016. Oz-Sorghum MII showed correlations (r) ranging from 0.62 to 0.93 within the main sorghum producing shires (35) of NE Australia. These shires contributes to 96% of total average production of all sorghum producing shires.