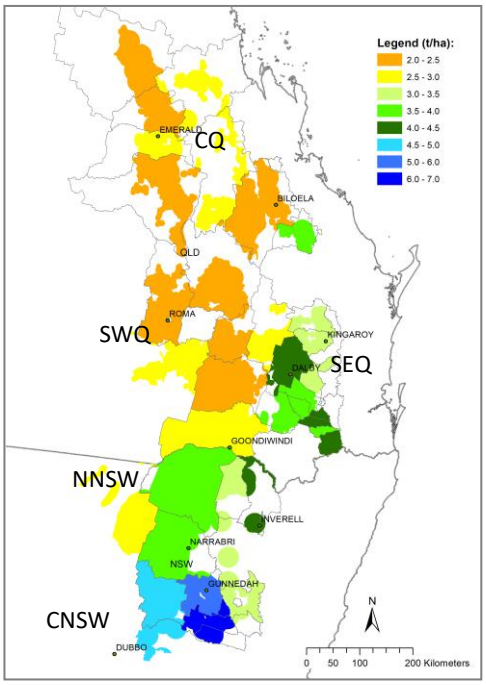
SEASONAL CROP OUTLOOK

Sorghum: January 2020

SUMMARY

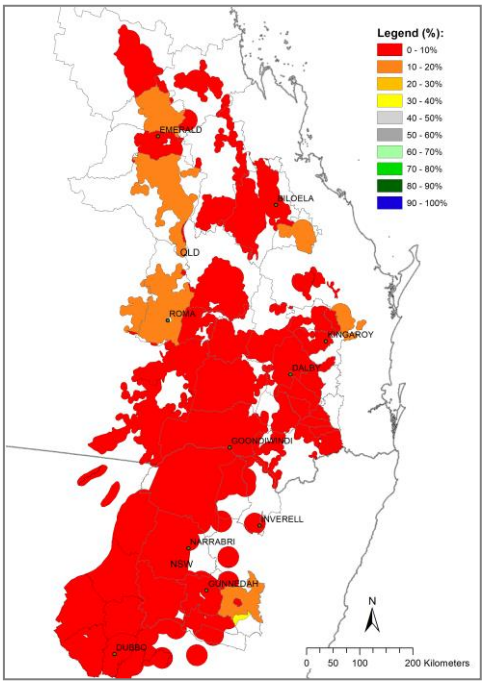
Current soil water conditions and seasonal rainfall outlook indicate a below average yielding sorghum crop for the 2019/20 summer crop season. Below average rainfall to date has continued to severely limit planting opportunities across most of the cropping region. If fact, most regions had no recorded plantings. Widespread average to above average rainfall is needed, during the next month to overcome severe stored moisture deficiencies and to induce some late summer plantings across all areas of the north-eastern Australian (NEAUS) summer cropping region. However, late plantings for most southern regions are highly unlikely to occur due to extremely low soil moisture profiles as well as an increase in pest, disease and frost risks. There remains variation in the outlook among local regions. Most areas in central QLD (CQ), southeast QLD (SEQ) and northern NSW (NNSW) are showing below to very much below average crop yield expectations. In contrast, some areas in southwest QLD (SWQ) and central NSW have sorghum yield outcomes close to or slightly above the long-term expectation. This crop outlook is based on a crop-free (fallow) practice through the winter season and therefore areas with longer fallow practices are likely to have better yield prospects for the coming season.



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

GENERAL CONDITIONS

Although some rainfall was recorded during December, the protracted drier than average period continued across the entire NEAUS' summer cropping region. Furthermore, rainfall during October to December was below to very much below average for most of the summer cropping region. At the end of December, few opportunities for sowing occurred and area planted to summer crops remains extremely low (estimated to be less than 80,000 ha; using latest satellite technology) due to the lack of sufficient sowing rainfall during the last three months across most of NEAUS' cropping region. Similarly, rainfall during the last 6-months was very much below average across most of the NEAUS cropping region. For some parts of southern QLD and NNSW rainfall recorded ranked in the lowest on record compared to all years. This caused estimated stored soil moisture levels (simulated through winter fallow using APSIM) to be nearly empty (<10%) throughout the summer cropping region. With the traditional planting window ended in most parts of the southern cropping regions, late plantings will be risky and are highly unlikely to eventuate 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. "consistently negative", at the end of December 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).



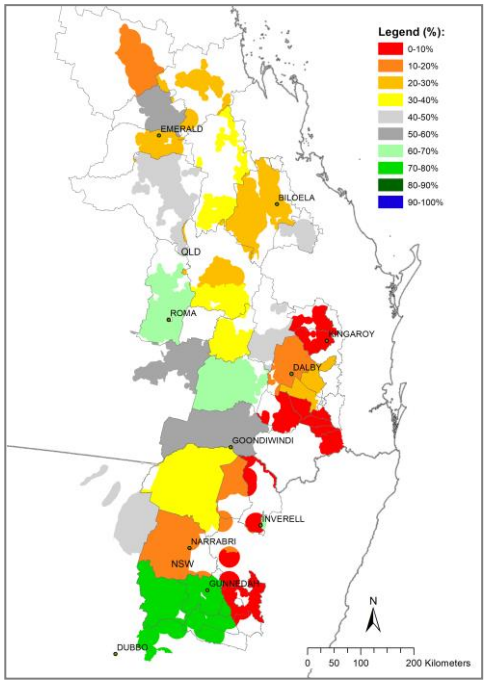
Map 2: Aggregated soil water recharge status (percentage) as at 1st January 2020. Simulation was done from 1st of April 2019 to end of December 2019 to mimic a short winter fallow before sowing of summer crops.

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 simulated performance over the past 119-years using an agro-climatic model for sorghum with long-term rainfall records. Probability of exceeding the long-term shire median yield for this year is shown in Map 3. Any areas coloured in light grey, yellow and red have a poor to very poor chance of having crops above the long-term median yield, whereas areas coloured in dark grey, green and blue have good to very good 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. "consistently negative" at the end of December period. The calculation of benchmark 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).

The current outlook is the combination of recharge of starting soil moisture profiles and the current rainfall outlook based on SOI phase analogue years from history with the same phase as at the end of December 2019. This resulted in the current crop outlook for below average chances (< 40%) of exceeding the long-term median yield for most areas in NEAUS summer grain region (Map 2). However, large variability exists between regions. Specifically, most parts of SEQ and northern NSW, have a highly reduced chance (20-30%) of final yields falling above the long-term shire yield expectation for that region. Conversely, some parts of CQ, SWQ and central NSW have chances similar to climatology (50:50) of exceeding the long-term median shire yield. At this stage of the season, the range of likely yield outcomes for the 2019/2020 season (see Regional Outlook below) remains wide as much of the growing season remains in the projected forecast. Updating each month, as the season progresses, causes the range of yield outcomes to narrow towards the final realised yield at the end of the season. *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*.



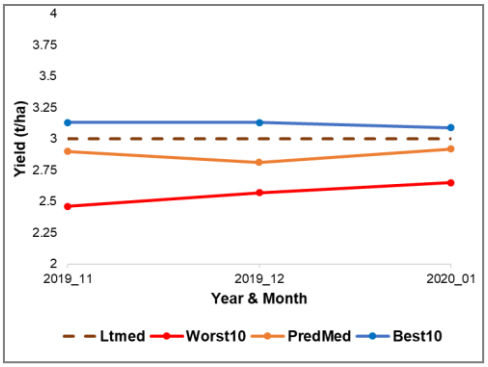
Map 3: Probability of exceeding the long-term simulated median shire sorghum yield.

POOR CROP CHANCE

At present, most parts of SEQ and NNSW have a moderately increased chance for sorghum crop yield 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 January is 2.90 t/ha, 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 2.59 t/ha, or higher than 3.08 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:



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

Region	Worst 10%	Median (50%)	Best (%)	Lt Median
CQ	1.85	2.16	2.58	2.41
SEQ	2.18	2.77	3.51	3.64
SWQ	1.96	2.50	2.70	2.33
QLD	2.07	2.50	2.79	2.72
NNSW	3.15	3.48	3.73	3.56

**Lt Median: long-term median.*

At this stage of the season, CQ, SEQ and NNSW have yield expectations below the long-term regional sorghum yield expectation. The exception was for SWQ, which have predicted yield outcomes similar to the long-term median. However, a wide range of possible outcomes still exists, which will narrow as the season progresses and the actual climate experienced is incorporated in the analysis. The current SOI phase of "consistently negative" indicates slightly 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 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, parts of CQ can plant to middle February with optimum management.

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 drawn 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.