Simulating Peanut/Wheat Cropping in The Burnett with APSIM

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Abstract

The APSIM model was used to simulate the relative benefits of double cropping (wheat and peanuts) versus peanuts with a winter fallow in the Burnett. Simulation results demonstrated that, in general, double cropping could be practiced successfully in the South Burnett.

Keywords: Cropping systems, peanut, wheat

Double cropping is frequently practiced on Red Ferrosols in the Burnett district. Wheat is commonly planted after peanuts with very little stored water at planting. In some instances, wheat is planted almost immediately after a peanut crop if planting rainfall (25 mm) has occurred. In many cases, the resulting wheat crop is not viable. Queries have been raised about the validity of this double cropping practice - how often does the wheat crop jeopardise the following peanut crop; what are the long-term yields for wheat and peanuts planted in this way?

One way to address this issue is with simulation models. APSIM (**A**gricultural **P**roduction **S**ystems **S**imulator, (1)) is a cropping system model capable of integrating the effects of the weather, soil and cropping management. We used APSIM to investigate the viability of double cropping in the Burnett.

APSIM was parameterised for a typical Red Ferrosol soil near Kingaroy, Queensland. Two cropping systems were simulated - peanut following wheat, and peanut with a winter fallow. PAWC for the soil simulated was 110 mm to 1.8 m deep. The lower limit of water extraction for the two crops was derived from experimental data. In the model, wheat was planted between 1 May and 31 July when available water in the top 50 cm was greater than 25 mm. Peanuts were planted between 15 October and 31 December on 55 mm or more plant available water in the top 50 cm. A 90 year weather record for Kingaroy was used.

Results and discussion

Median peanut yields were 2.8 t/ha in the peanut/wheat rotation and 2.9 t/ha in the peanut only system. Probability of exceedence curves for yield and soil water at planting are given in Figure 1 and 2. The distribution of peanut yields from the peanut/wheat and peanut only systems were similar. This indicated that, on average, wheat did not reduce planting soil moisture or yield of the following peanut crop. This was because the peanut crop commonly received adequate soil water after planting to maintain yields. Even if soil water at planting was high, low in-crop rain could result in low peanut yields.

Conclusions

Simulation results demonstrated that double cropping could be practiced successfully in the South Burnett. In general, a winter fallow did not result in improved utilisation of rainfall for peanut growth, nor increased yields.

References

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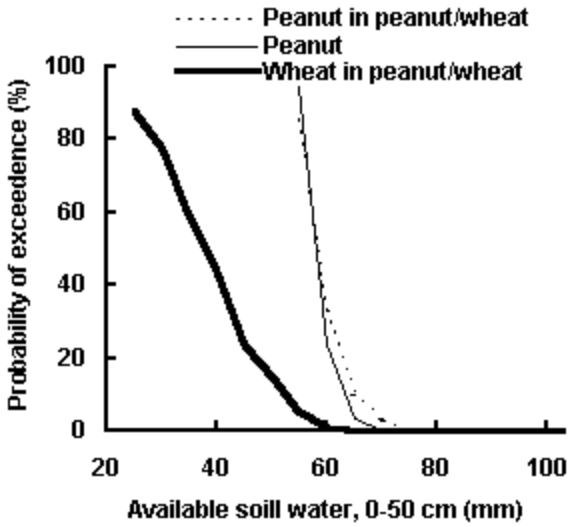

Figure 1: Probability distributions of peanut and wheat yields in the peanut/wheat and peanut systems.

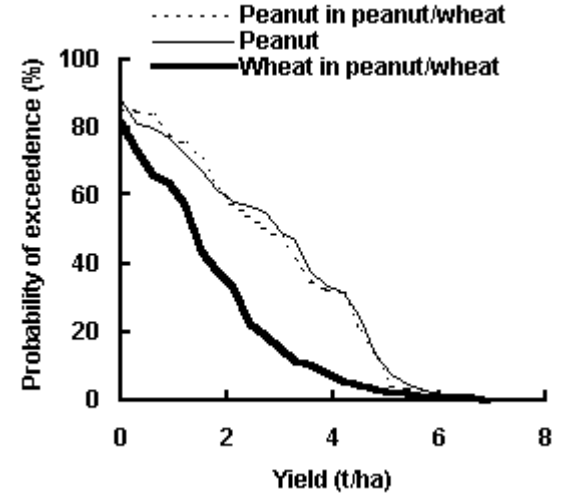

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Figure 2: Probability distributions of soil water at planting in the two systems. Wheat was not planted if soil water was < 25 mm, or < 55 mm for peanuts.