

## Improved RSD management in Harwood leads to record yields

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### Abstract

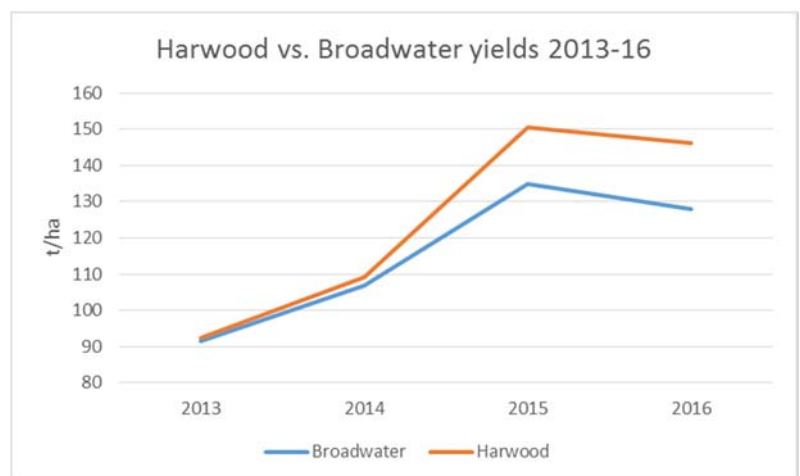
Major changes in the management of ratoon stunting disease (RSD) at Harwood have resulted in record yields in 2015 and 2016. These changes, facilitated by an active extension campaign, involved increased availability of clean seed, preferential recommendations of resistant varieties, prioritisation of approved seed plot (ASP) billets, implementation of a billet delivery system, and changing to LSB-PCR as the RSD diagnostic test. The 2015 and 2016 yields of 151 t/ha and 146 t/ha respectively, are the highest consecutive yields recorded for Harwood, while the 2015 one year old yield of 120 t/ha was the highest on record. Comparison with Broadwater, which harvests a similar proportion of 2YO cane but is only beginning to adopt the RSD control measures deployed at Harwood, shows that in these years yields were lower by 15.5 t/ha and 18.2 t/ha, amounting to potential lost revenue of \$2.9m and \$3.6m respectively. If, as has been shown in Harwood and other areas, managing RSD leads to such significant yield gains, the incidence and the impacts of the disease must have been previously underestimated. This poster concludes that further, industry-wide gains can be made in RSD management by the production of resistant varieties.

### Poster paper

Sugarcane yields are affected by so many factors that it can be difficult to confidently attribute noticeable changes to any single one. However, when record yields are preceded by significant changes in management practices across a region, it is reasonable to assume these changes have had some effect.

Since 2013, Harwood has tripled its annual clean seed uptake as part of an integrated extension program to combat ratoon stunting disease (RSD) (Young 2016). This program also included preferential variety recommendations based on RSD reaction, and replacing evaporative binding enzyme immunoassay (EB-EIA) with leaf sheath biopsy quantitative PCR (LSB-qPCR) to screen seedbeds. The 2015 average yield of 151 t/ha was the second highest on record, after 1962, which itself was preceded by an expansion into highly fertile virgin land, and when harvester losses were minimal as cane was cut by hand. The 2015 1YO yield of 120 t/ha was the highest ever recorded for Harwood. Despite a significantly drier season in 2016, the average yields were 146 t/ha. Together, these represent the highest consecutive yields recorded for Harwood.

The Harwood yields for 2015 and 2016 were 15.5 t/ha and 18.2 t/ha higher than neighbouring Broadwater (Fig 1), which has a similar proportion of 2YO cane, but has not adopted the RSD control measures in place at Harwood. The translated yield differential amounts to \$2.9m and \$3.6m of potential lost revenue at Broadwater for 2015 and 2016 respectively. While other factors may have played a part, the possibility that these record yields are independent of the preceding record clean seed uptake defies reason, particularly when the incidence of RSD is much higher than what is generally acknowledged.



LSB-qPCR has demonstrated that the longstanding EB-EIA/PCM test results in unacceptably high levels of false negative diagnoses. Even among other serological techniques, EB-EIA is demonstrably unreliable (Hoy *et al.* 1999), while phase contrast microscopy (PCM) confirmation leads to even more false negatives (Young *et al.* 2016). For example, in 2014, EB-EIA/PCM correctly identified RSD in only 3% of Harwood seedbeds, while the true rate was 30% (Young *et al.* 2016). The diagnostic deficiencies of EB-EIA/PCM are compounded by the fact that only the healthiest cane available (*i.e.* seedbeds) are typically screened. Commercial fields have significantly higher RSD rates than seedbeds, but are rarely, if ever, tested (Young 2016). These facts skew perceptions about the incidence of RSD, although several other danger signals have not been noticed generally in the Australian sugar industry.

There is a higher incidence of RSD in replant versus fallow plant. This observation is highly informative of the disease status of the ploughed-out crop, and has implications for the reasons why it was removed in the first place (Young *et al.* 2012). Likewise, although RSD factsheets (both SRA and BSES) assert that “generally RSD affects fewer than 5% of Australian canefields”, there has never been a co-ordinated, industry-wide RSD survey of different varieties and crop classes to establish this claim.

The situation at Harwood is not unique, as a related phenomenon has been revealed in the Herbert (Stringer *et al.* 2016). Growers who regularly purchased clean seed had 13% higher yields than those who never purchased clean seed, while interestingly, infrequent users gained virtually nothing on those that never purchased clean seed. This strongly suggests a high baseload of RSD in the Herbert, the effects of which are only mitigated by the highest standards of RSD control. When the Australian sugar industry eventually tests its commercial crops, it will be in a better position to gauge the impacts of RSD.

Based on the Harwood and Herbert experiences, if better RSD control delivers such substantial yield increases, then it is conceivable that these same yield increases can be translated to the broader industry by actively pursuing RSD-resistance in the plant improvement program. The time and cost of ongoing RSD control programs is enormous, and prevent PSC personnel from actively pursuing other measures to boost productivity. This cost, if transferred to the proper authority by the production of RSD-resistant varieties, could boost Australian yields by 10%, delivering an additional annual revenue of \$200m, more than paying for itself.

RSD-resistant varieties would extend the benefits of hot water treatment across the whole Australian industry, and, in the face of higher than previously thought RSD rates, might also be the elusive better-ratooning varieties the industry has been seeking.

## References

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