

**Trial Title:** SBT22-820 Periodic harvest of sugar beet and biorepellant interaction

**Centre:** Morley

**Trial Code:** SBT22-810

**Variety:** Wren

**Objective:** To examine the benefit of sugar beet treated with Frass as a biorepellent to reduce aphid transmission of virus yellows.

**Background:** In 2021 and 2022 solid and foliar applications of Frass were applied to sugar beet at Morley to examine claims that the material might act as a biorepellant to insects. Frass is the co-product of farming Black Soldier Flies and contains chitin (14% of frass by weight) which contains nitrogen, phosphorous and potassium as well as iron, calcium, magnesium and zinc. It is suggested that as chitin is also found in insects, plants mistake the high chitin content of frass as a warning of insect attack causing the plants to up-regulate natural defence mechanisms, making them stronger and less palatable to insect pests. It is also suggested that these same mechanisms have effectiveness at reducing plant disease.

**Summary:** In 2022, Frass was applied in both solid and liquid forms to sugar beet plants in a randomised block design in addition to a one and two spray fungicide programme of Angle, (azoxystrobin + difenoconazole). The solid Frass was applied on 13/04/22 and the foliar application on 04/07/22. The fungicide treatments were applied on 28/07/21 and 01/09/22.

- In 2022 cv Wren was drilled on 24/03/22. Establishment for sugar beet in 2022 was challenging due to the very dry spring. The weather then continued to be unfavourable for sugar beet with the heat wave in the summer which is indicated in the yields with the highest yielding treatment being treatment 8 (2 x fungicide plus foliar Frass) which presented a modest yield of 61.0 adjusted tonnes/hectare compared with the highest yield in 2021 of 112.
- All other inputs were as the Morley farm crop with the exception of fungicide applications.
- Figure 1 shows the yield for all the treatments. There is no significant difference in adjusted yield from any of the treatments this year.
- There is a small difference in the percentage of sugar (Figure 2) with treatment 8 (2 x fungicides plus foliar Frass) being different to treatment 3 (no fungicides and solid Frass) but there is no pattern with any of the other treatments and so this is more likely due to the variability shown across the trial this year. There was no difference in the K or AN. There were differences in the NA levels with two of the Frass suspensions treatments being higher than untreated, but the third Frass suspension treatment showed much lower levels.
- 2022 also saw the appearance of the beet moth (*Scrobipalpa ocellatella*) which infected large areas of beet in East Anglia. This trial had a large infestation with 88% of plants affected by October, although at this stage of the year, the damage was localised to the crown and the caterpillars soon disappeared allowing some new growth to develop.
- As there was virus yellows present this year, we compared the treatments with simple averages of percentage leaf infection to see if the Frass had affected aphid numbers shown in Figure 3. No consistent pattern is visible across the treatments.

This trial was funded by NIAB Morley Long-term Studies programme

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Figure 1. Figure 1. Yield (adjusted tonnes/ha) shown across nine treatments.

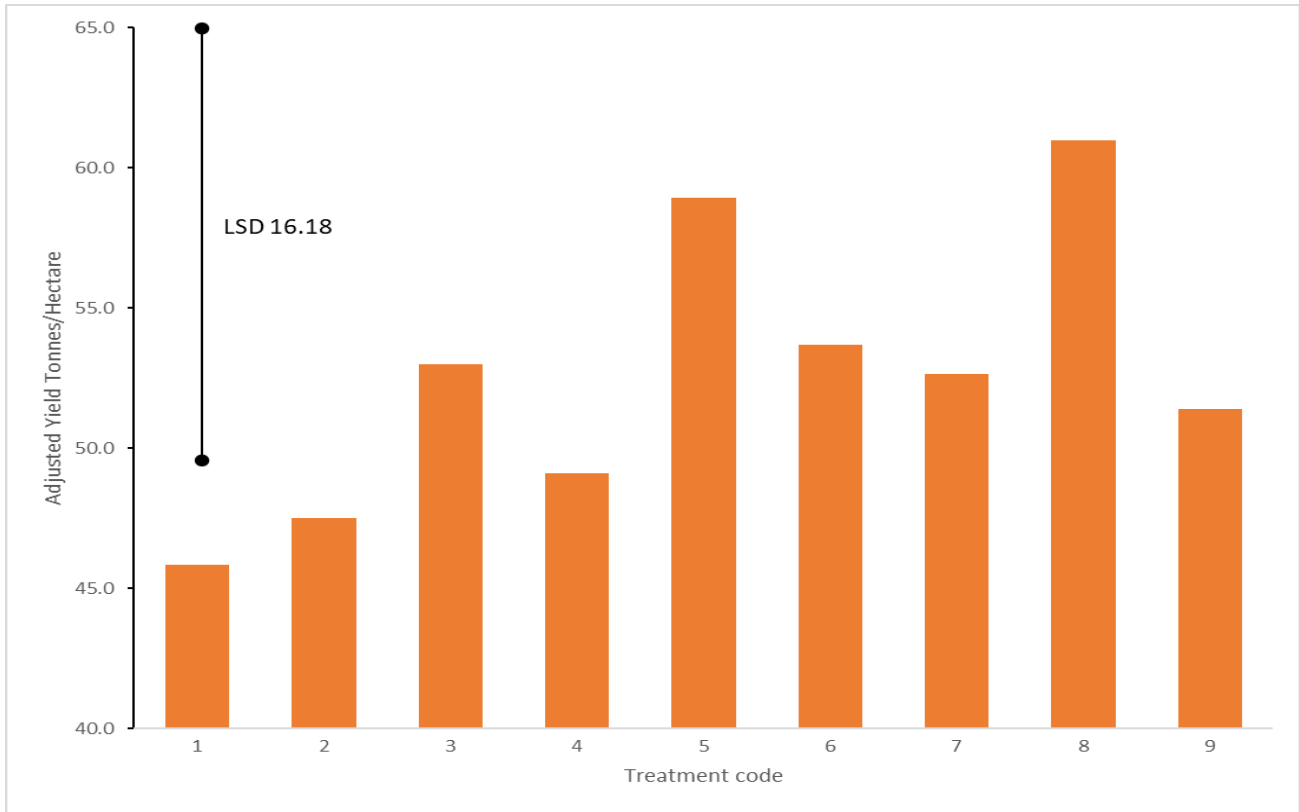
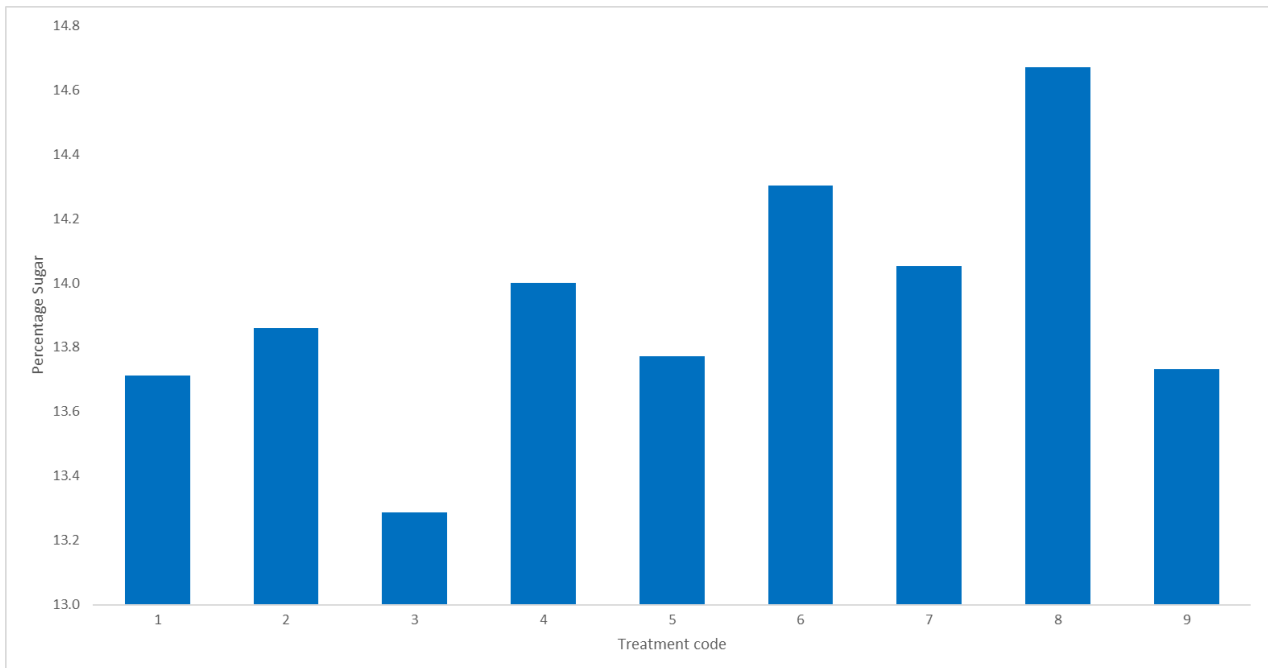


Figure 2. Percentage sugar across nine treatments



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Figure 3. Percentage virus yellows infection across nine treatments

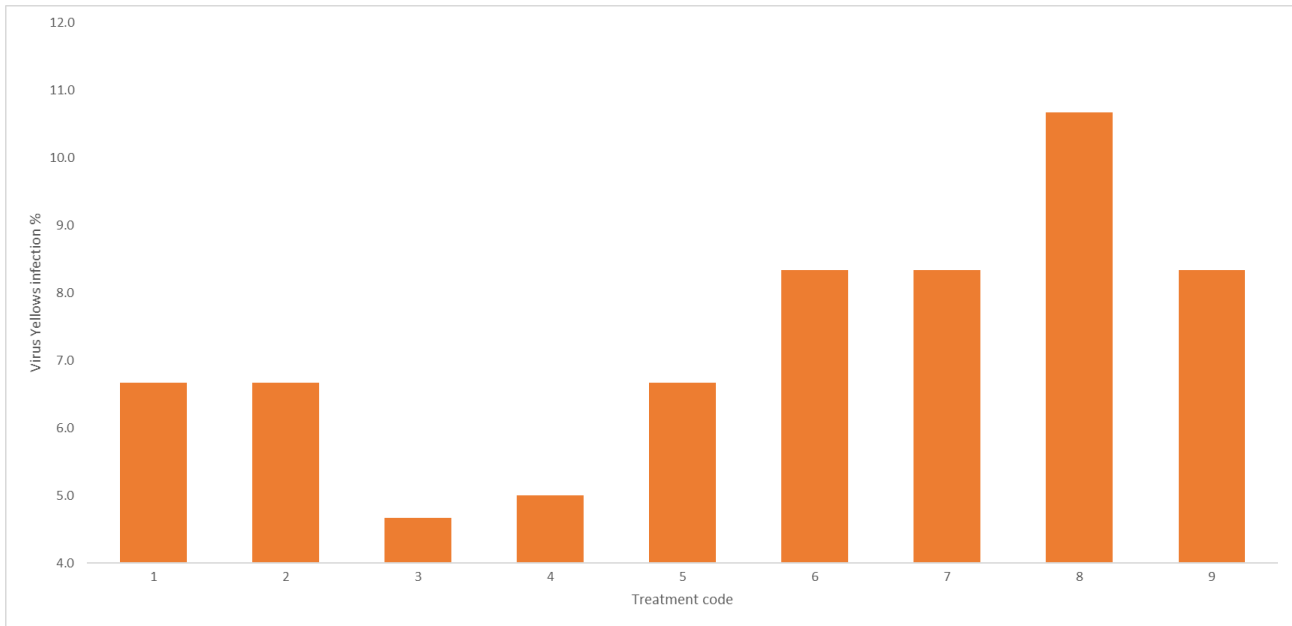


Table 1. Treatment List

Treatment	Treatments T1	Treatments T2	Frass	Lift date
<b>Timing</b>	Mid July	Mid August (4 week interval)	Post drilling (solid) June (suspension)	January
1	-	-	-	January
2	-	-	Suspension (applied at 20kg/ha)	January
3	-	-	Solid (applied at 1 t/ha)	January
4	Angle @ 1.0 l/ha	-	-	January
5	Angle @ 1.0 l/ha	-	Suspension (applied at 20kg/ha)	January
6	Angle @ 1.0 l/ha	-	Solid (applied at 1 t/ha)	January
7	Angle @ 1.0 l/ha	Angle @ 1.0 l/ha	-	January
8	Angle @ 1.0 l/ha	Angle @ 1.0 l/ha	Suspension (applied at 20kg/ha)	January
9	Angle @ 1.0 l/ha	Angle @ 1.0 l/ha	Solid (applied at 1 t/ha)	January

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**Field details**

<b>Trial Code:</b>	SBT22-820
<b>Trial Centre:</b>	Morley
<b>Trial Location:</b>	Morley
<b>Crop:</b>	Sugar Beet
<b>Previous Crop:</b>	Winter Wheat
<b>Soil type:</b>	Sandy Loam
<b>Total N/ha applied</b>	91 kgN/ha
<b>Drill Date:</b>	24/03/22
<b>Seed rate:</b>	1.1 Unit/ha
<b>Drilled plot size:</b>	3m x 10m
<b>Replicates:</b>	3
<b>Harvest date:</b>	Various as treatments

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