

**Trial Title:** SBT21-820 Studies on the effectiveness of Frass as a bio-repellent to reduce virus yellows.

**Centre:** Morley

**Trial Code:** SBT21-820

**Variety:** LG BTS 4100

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

**Background:** In 2021 solid and foliar applications of Frass were applied to sugar beet at Morley to examine claims that the material might act as a bio-repellant 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 2021, 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 Escolta (cyproconazole + trifloxystrobin). The solid Frass was applied on 17/06/21 and the foliar application on 26/06/21. The fungicide treatments were applied on 23/07/21 and 25/08/21.

- In 2021 cv KWS BTS 4100 was drilled on 06/04/21. Establishment for sugar beet in 2021 was generally good in all areas and the trial established well. This variety has moderate disease resistant ratings with 5.1 for rust and a low 2.6 for powdery mildew. The lift date was 06/01/22.
- All inputs were as the Morley farm crop with the exception of fungicide applications.
- Maximum yield (112t/ha) was achieved with treatment 7, the two-fungicide spray programme without Frass applied. However, this yield was not significantly different from the other treatments.
- Figure 1 (below) shows the yield for all the treatments. There is no significant difference in adjusted yield from any of the treatments this year.
- The plots were assessed for green leaf area, *Uromyces betae* (rust), *Cercospora beticola* (leaf spot) and *Peronospora farinose* (downy mildew). These are assessed by estimating the total % of each of the total leaf area. There was no downy mildew recorded. Rust and cercospora leaf spot pressure also remained very low. There was no Virus Yellows recorded this year.
- A spad metre was used on the leaves and although there was some variation, the trend appeared to be more related to the higher fungicide inputs.
- There is a difference in sugar percentage (Figure 2 below), these differences do not show a pattern with the treatments. Three of the four highest sugar percentages (treatments 3,6 and 9) all had solid Frass applied but the highest figure (treatment 7), had no Frass applied. There was no difference in the NA or AN levels and minor differences in K levels.

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

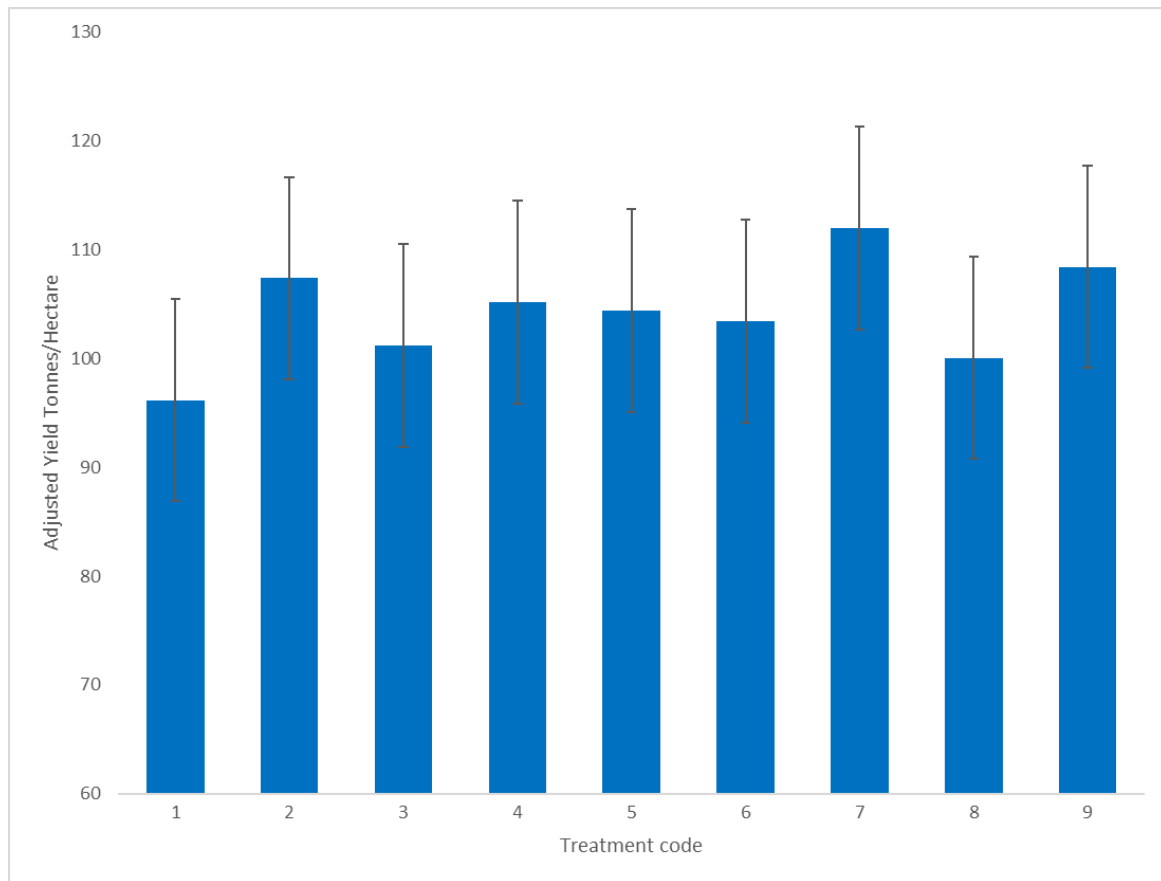
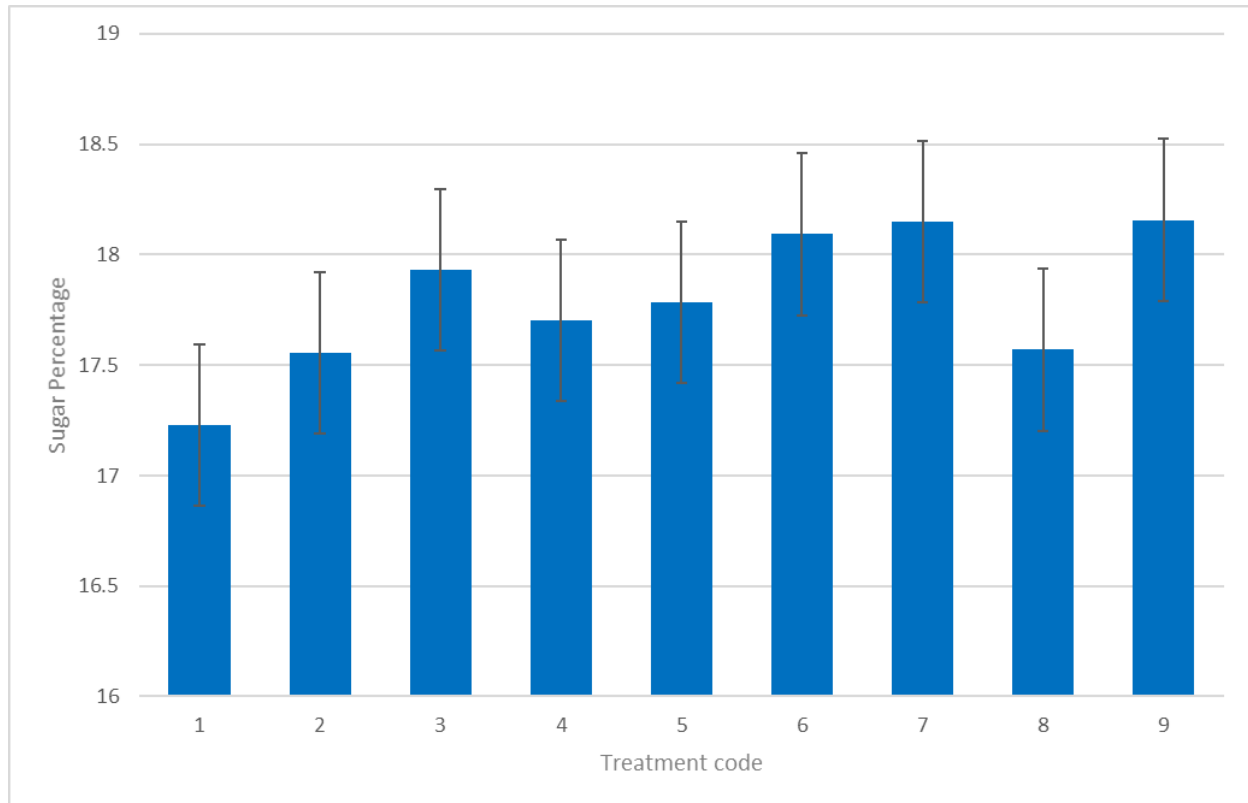


Table 1 Fungicide and Frass Treatments

TRT	Treatments T1	Treatments T2	Frass	Lift date
<b>Timing</b>	Mid July	Mid August (4 week interval)	Early June	January
1	-	-	-	January
2	-	-	Suspension	January
3	-	-	Solid (applied at 1 t/ha)	January
4	ESCOLTA @ 0.35 l/ha	-	-	January
5	ESCOLTA @ 0.35 l/ha	-	Suspension	January
6	ESCOLTA @ 0.35 l/ha	-	Solid (applied at 1 t/ha)	January
7	ESCOLTA @ 0.35 l/ha	ESCOLTA @ 0.35 l/ha	-	January
8	ESCOLTA @ 0.35 l/ha	ESCOLTA @ 0.35 l/ha	Suspension	January

9	ESCOLTA @ 0.35 l/ha	ESCOLTA @ 0.35 l/ha	Solid (applied at 1 t/ha)	January
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Figure 2. Percentage sugar across nine treatments



Appendix

Field details:

Trial Code	SBT21-820 (Morley LOTs)
Trial Centre	Morley
Trial Location	Morley
Crop	Sugar Beet
Previous Crop	Winter wheat/Maximus Cover Crop
Soil Texture	Sandy loam
Soil Series	Ashley
Soil analysis:	N/A
Soil Mineral Nitrogen	N/A
Total N/ha applied	127 kgN/ha
Drill Date	06/04/2021
Variety	BTS 4100
Seed Rate	1.15 Unit/ha
Drilled Plot Dimensions	3m x 10m
Replicates	3
Harvest Date	06/01/2022