2011 SOYBEAN TINEWEED

In 2011, the University of Vermont Extension Crops and Soils Team conducted an evaluation of tineweeding as a weed management strategy for soybeans in Alburgh, VT. Tineweeding is a type of mechanical cultivation that is implemented early in the field season. A tineweeder is a low-cost and simple piece of equipment designed to disturb the root zones of weed seedlings while they are in the very delicate “white thread root” stage (Image 1). This disturbance often results in weed seedling desiccation and death. This study also sought to evaluate the timing of tineweeding as it heavily influences the amount of damage caused to weed seedlings.

Image 1. White thread stage of weed seedling.

MATERIALS AND METHODS

The effectiveness and timing of tineweeding as a weed control tool in soybeans was evaluated with replicated plots at Borderview Farm in Alburgh, VT. Agronomic information is presented in Table 1.The soil type was a Benson rocky silt loam and the previous crop was corn. For this experiment, the design was a randomized complete block with three replications. Four treatments were evaluated: tineweeding 13 days after planting (DAP), tineweeding 21 DAP, tineweeding at both 13 and 21 DAP, and no mechanical weed control. The plot size was 10’ x 25’. Before planting, on May 24, 2011 the herbicide Treflan (trifluralin) was sprayed on the plots at a rate of 2.5 pints per acre. The soybeans (Mycogen variety PB5B130RZ) were planted on June 14, 2011 with a John Deere 1750 four-row planter at 180,000 seeds per acre. Rows were 30 inches wide. Weed and crop populations were measured at 13 and 21 DAP. Plots were harvested with an Almaco SP50 plot combine on November 1, 2011. Yield was measured by weighing the harvested seeds. At harvest, moisture, and test weight were measured with a Dickey-John M20P moisture meter and a Berckes test weight scale.

Table 1. Agronomic and trial information for the 2011 soybean tineweeding trial.

Location	Borderview Farm-Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Corn
Tillage operations	Spring disk, harrow, spike-toothed harrow
Herbicide	Trifluralin, pre-plant, 24-May, 2.5 pts/acre
Plot size (ft.)	10 x 25
Replicates	3
Row width (in.)	30
Planting date	14-Jun
Variety	Mycogen PB5B130RZ
Tineweeding dates	27-Jun (13 DAP), 5-Jul (21 DAP)
Harvest date	1-Nov

Variations in yield and quality can occur because of variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among treatments is real or whether it might have occurred due to other variations in the field. All data was analyzed using a mixed model analysis where replicates were considered random effects. At the bottom of each table a LSD value is presented for each variable (e.g. yield). Least Significant Differences (LSDs) at the 10% level (0.10) of probability are shown. Where the difference between two treatments within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two values. Treatments listed in bold had the top performance in a particular column; treatments that did not perform significantly lower than the top-performer in a particular column are indicated with an asterisk. In the example at right, treatment A is significantly different from treatment C but not from treatment B. The difference between A and B is equal to 400, which is less than the LSD value of 500. This means that these treatments did not differ in yield. The difference between A and C is equal to 650, which is greater than the LSD value of 500. This means that the yields of these treatments were significantly different from one another.

Variety	**Yield**
A	**1600***
B	1200*
C	950
LSD (0.10)	500

RESULTS

Seasonal precipitation and temperatures recorded at a weather station in close proximity to the 2011 research site are shown in Table 2. This year presented a wet and soggy spring resulting in a delayed planting. Temperatures were a little warmer than normal (3.3°F higher than average monthly temperatures between June and October) and there were a few dry months in the summer. This year there were 2,530 Growing Degree Days (GDD’s) accumulated, 398.7 more GDDs than the 30-year average.

Table 2. Temperature, precipitation, and Growing Degree Days (GDDs) by month for Alburgh, VT

South Hero, VT (Alburgh)	June	July	August	September	October
Average temperature (°F)	67.1	74.4	70.4	63.8	51.5
Departure from normal	1.3	3.3	1.6	5.8	4.5
Precipitation (inches)	3.52	3.68	10.23	5.56	2.68
Departure from normal	0.09	-0.29	6.38	2.10	0.10
Growing Degree Days (base 50°F)	513	732	563	392	330
Departure from normal	39.0	79.5	-27.0	79.5	228

Overall, there was low weed pressure in the trial area. Most of the weeds identified in this trial were annual plants. Annual grasses identified included foxtails (*Setaria* spp.), crabgrass (*Digitaria* spp.), barnyardgrass (*Echinochloa crus-galli* (L.) Beauv.), and witchgrass (*Panicum capillary* L.). Annual broadleaf plants identified in the trial included redroot pigweed (*Amaranthus retroflexus* L.), common lambsquarters (*Chenopodium album* L.), common ragweed (*Ambrosia artemisiifolia* L.), three-seeded mercury (*Acalypha virginica* L.), and Pennsylvania smartweed (*Polygonum pensylvanicum* L.). There was also some very competitive field bindweed (*Convolvulus arvensis*) in this trial.

There were no significant differences among weed control treatments for yield, moisture, or test weight (Table 3). The low weed pressure experienced by the soybean overall was likely the reason why no significant differences were observe between treatments. The trial yield average of 46.3 bushels per acre was 7 bushels higher than the state average. The soybean trial was planted two or three weeks later than normal due to poor early season weather conditions. This delayed planting date may have also reduced weed pressure. Often the first flush of spring weeds can be eliminated through use of a stale seedbed practice. Although not intended, the late seedbed preparation of this trial would have removed many of the first and second flush of weeds usually seen in May and June. Further research needs to be conducted to determine efficacy of tineweeding as a weed control method in soybeans.

Table 3. Impact of tineweeding on soybean yield, moisture, and test weight.

Treatment	Harvest moisture	Test weight	Yield @ 13% moisture		
	%	lbs/bu	lbs/acre	tons/acre	bu/acre
Control	11.7	57.3	2512	1.3	43.8
Tineweed 13 DAP	11.6	**57.7**	2731	**1.4**	47.4
Tineweed 21 DAP	11.6	**57.7**	2647	1.3	45.9
Tineweed 13 & 21 DAP	**11.8**	57.3	**2760**	**1.4**	**48.2**
LSD (0.10)	NS	NS	NS	NS	NS
Trial Mean	11.7	57.5	2663	1.3	46.3

NS – No significant difference was determined between treatments.

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