Effects of Row Covering Materials and Depth of Planting on Sugarbeet Emergence

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Introduction

Attempts to plant sugar beets to a stand in the Central Coast area of California have met with varied success. While planting to a stand has been successful experimentally,[2] there has been a reluctance on the part of growers to accept such a practice commercially. Several reasons may be given for this, including inadequate control of seed bed conditions with respect to weed control,[3] moisture relations and soil crust problems. Experimental work has shown that mulches can have a beneficial effect on sugarbeet emergence (1). To find a satisfactory method for alleviating the detrimental effects of soil crusts was the object of this research.

Procedure

In the experiments conducted, the soil was prepared in double row 40-inch beds by standard operations for the area with bed shaping accomplished by the use of a sled-mounted rotary hoe and shaper. Predetermined numbers of seeds were planted by hand at the depths desired. The seeds were then covered with the materials being tested as anticrusting agents or with soil in the check plots. This was followed by sprinkler irrigation to supply the necessary irrigation water for germination and emergence. All treatments were placed in replicated randomized block arrangements, and the results were analyzed by standard statistical methods. Data taken included percent of seedlings emerging, mean emergence periods, and, in one experiment, seedling weights after a set number of days from planting. The soil on which these experiments were conducted was Salinas silty clay loam and the sugarbeet variety used was S-301-H. When vermiculite was used, it was stabilized with a polyvinylacetate spray to prevent it from washing or blowing away.

Results and Discussion

In 1966 three experiments were conducted. In the first the seed was planted on January 28 when soil conditions were relatively cold, whereas the other tests were seeded later in the year, April 20 and June 9, when soil temperatures were considerably warmer.

In test 1, stabilized vermiculite covered seeds emerged at 74%, coke covered seeds at 53%, soil sprayed topically with petroleum

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[2] Numbers in parentheses refer to literature cited.

mulch covered seeds at 29%, and soil covered seeds at 28%. Visual observations disclosed that while soil moisture was adequate, soil crusting was rather severe in this test. Graphically, the results are shown in Figure 1.

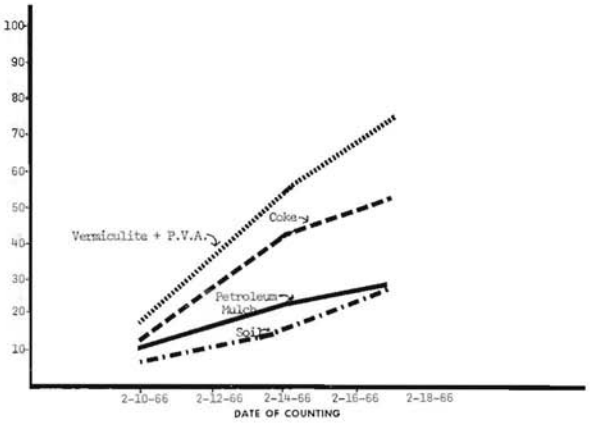

Figure 1.—Sugarbeet emergence pattern under different covering materials. Planted January 28, 1966.

In tests 2 and 3 the results were similar. The time required for emergence was less where vermiculite was used, but at the end of the germination period no appreciable difference in stand was observed. This is depicted in Figure 2.

In 1967 two studies were conducted in which emergence percentage and rates of emergence of sugarbeets were observed when the seeds were planted at varying depths under stabilized

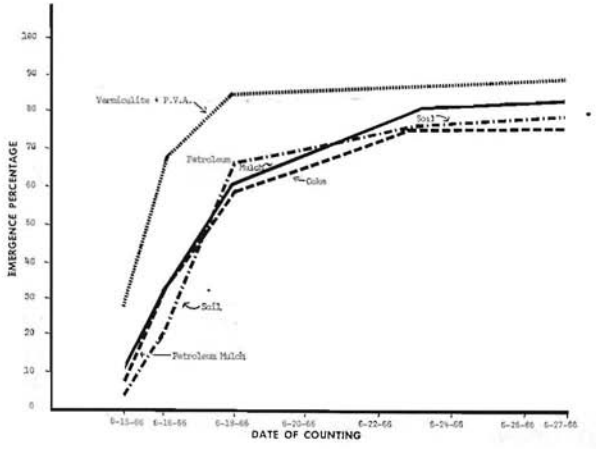

Figure 2.—Sugarbeet emergence pattern under different covering materials. Planted June 9, 1966.

vermiculite and soil. Dry weights of the seedlings after a month's time were also determined in the second test.

In these tests there was a significant interaction of covering material and depth of planting. Emergence under both soil and vermiculite was best described as a parabolic function with maximum emergence occurring at one-half inch under soil and at one inch under vermiculite. This possibly reflected a tendency for the vermiculite to dry out too quickly at lesser depths. It was also observed that some of the seeds emerged without the cotyledons opening when covered with vermiculite. This tendency was more severe at the one-half inch depth of planting. In the first experiment there was no difference in percentage emergence with covering material, but in the second experiment more soil crusting occurred and the percentage emergence was greater under stabilized vermiculite. The relationship of percent emergence to depth of planting for the two tests combined is shown in Figure 3.

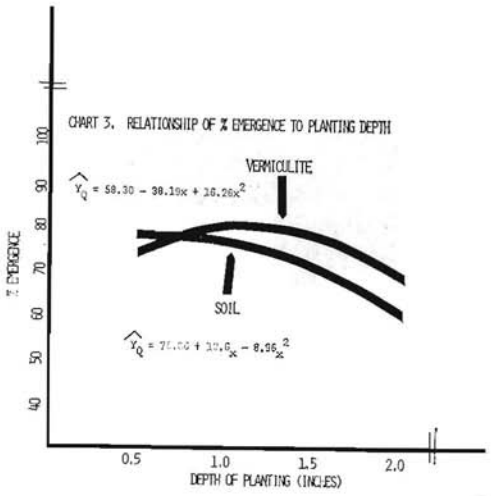

Figure 3.—Relationship of % emergence to planting depth.

The mean emergence period was also calculated for each treatment. In both tests it was diminished when vermiculite was used to cover the sugarbeets as compared to those covered with soil. In test 1, the mean lowering of emergence time was 1.2 days, and in test 2 it was 2.8 days. There was no significant interaction between depth of planting and covering material. The combined effects of vermiculite and soil coverings on sugarbeet emergence are reported in Table 1.

Seedling size was not affected by depth of planting, but those germinating under vermiculite cover made greater growth. This

Table 1.—Mean emergence period of sugarbeets when planted at varying depths under soil and stabilized vermiculite.

Depth planted inches	Mean emergence period (days)	
	Soil	Vermiculite
0.5	12.6	11.0
1.0	13.0	10.9
1.5	12.8	11.3
2.0	14.3	11.5
L.S.D. 0.05	0.7	

Table 2.—The effect of covering material and depth of planting on the dry weight of sugarbeet seedlings.

Depth planted inches	Mg/seedling at 30 days	
	Soil	Vermiculite
0.5	183	233
1.0	170	237
1.5	182	195
2.0	125	210
Mean	166	219*

* Sig. at 5% level.

is probably a result of the shorter emergence time required, and possibly because of lessened energy needs of the seeds emerging through vermiculite as compared to those emerging through soil. These data are shown in Table 2.

Summary

Under conditions where soil crusting was a factor, stabilized vermiculite and coke placed over the seeds resulted in significantly better sugarbeet emergence compared to seeds placed under soil. Advantageous use of such materials with respect to percentage of emergence appears likely only where considerable soil crusting occurs. The emergence under soil decreased with depth, but with vermiculite maximum emergence was at one inch compared to lesser and greater depths.

The mean emergence period of seeds covered with stabilized vermiculite was lower than when covered with soil. The mean emergence period was increased with depth regardless of seed covering used, but the magnitude of the increase was small.

Seeds covered with vermiculite produced seedlings of significantly higher dry weight compared to those covered with soil.

Literature Cited

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