

Total Aerobic Thermophilic Spores

"For the five samples examined, there shall be a maximum of not more than 150 spores and an average of not more than 125 spores per 10 grams of sugar."

Aerobic Flat Sour Spores

"For the five samples examined, there shall be a maximum of not more than 75 spores and an average of not more than 50 spores per 10 grams of sugar."

Anaerobic Sulfide Spoilage Spores

"These shall be present in not more than two (40 percent) of the five samples and in any one sample to the extent of not more than five spores per 10 grams."

Anaerobic Thermophilic Hard Swell Spores

"These shall be present in not more than three (60 percent) of the five samples and in any one sample to the extent of not more than four (65 percent) tubes (method for testing.)

The screening test made on the weekly composite merely supplements those made on each shift at the factory and includes some additional sieves, all sieves of the control set being of U. S. Bureau of standard specification.

CERCOSPORA CONTROL BY SPRAY AND DUST

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The sugar beet growing area of Eastern Canada centers in the most southerly point of Canada, between Lakes Erie, St. Clair and Huron.

Cercospora infection has been severe in the factory areas in 4 years out of the past 8 years, and fairly general in 1932, 1935 and 1937. Our beets lost most of their normal leafage in August and grew an extended crown and new tufts of leaves before harvest. The sugar contents in the years of severe infection were:

1931 -	Local beets	14.4%	outside areas	15.4%	general average	14.76%
1932 -	" "	14.5%	" "	15.4%	" "	14.87%
1935 -	" "	14.9%	" "	15.8%	" "	15.28%
1937 -	" "	(14.9%)	" "	(16.0)	" "	(15.35)

Among the recommendations for mitigation of Cercospora infection are the following and our experience with them:

1. Deep Fall Plowing. It has had little to do with Leaf Spot occurrence since 85% of our beet fields are fall plowed regularly and only 2% is unplowed. This 2% is in rotation and plowed for other crops.

2. Crop rotation is important, and since 1933 a clause has been in our contract stating that beets are not to be planted on land that was in beets the previous year. Beets after beets is now less than 1% of our acreage and usually on part of a field altered for refencing. "Beets after beets" has proven time after time to lead to early infection and severe leaf blight. When part of a field has been in beets the previous year we have found that part brown with dead beet leaves while the rotation part was green. Unfortunately the Cercospora spreads rapidly and two weeks later the whole field is brown. Adjacent beet seed plots have also spread infection early and severely.

One of the most striking cases occurred this past season on a farm where we tried out some commercial seed varieties on a field that had been in beets the previous year. It had been in alfalfa and pasture for 20 years previously and this year averaged 13.7% sugar, while a field across the land which was in a 5 year rotation averaged 17.1% sugar when harvested at the same time.

3. Removal of Beet Tops is very important and in my opinion, the failure to do so in our local factory areas, has been a distinct contributing cause to high infection. High priced land suited to market gardening and cash crops, does not carry sufficient live stock to utilize the tops and a large proportion is consequently left to rot on the fields. We are encouraging piling, pitting, siloing and feeding, but improvement is slow. We do not know how long the spores remain viable in the soil, but it is probably several years at least. We also want data on the biologic strains and the carrying of infection on weeds or other plants.

4. Spraying beets was undertaken in 1933, when 40 gallon Massey Harris Sprayer was used with one, two and three sprayings of 4-4-40 (Bordeaux). Tonnages were increased by 1.6 tons, sugar by 1.3% and purity of juice by 3%. 1934 had a dry midsummer and the beet crop was late in developing, so that spraying was not feasible, but in 1935 the results were striking. Three sprays gave increases of 4 tons per acre, 2.3% higher sugar and 3% increase in purity of juice. A 100 gallon sprayer with 21 nozzles, 3 to a row, was used and loaned to about 25 farmers. The time taken to spray during grain harvest rush and the lack of handy water supply caused the farmers to rely on a single spray. They averaged 3/4 ton increase with .7% higher sugar, but keeping the nozzles clear was a fag.

In 1936 a power duster was used, as well as the wet spray, and equally good results were obtained. The dust was easier to apply, but the cost of materials was tripled. It was not a year of severe leaf spot and only local area beets were affected.

In 1937 excessive spring rains flooded out a considerable acreage and the stand was lessened so that Cercospora was not anticipated. Beet top growth was luxuriant, and humidity was excessive throughout August. As in 1935 many 12 ton per acre estimates turned out to be 8 ton crops due to Leaf Spot. The following are the results with a small 2 row hand duster, costing less than \$15. and using 35 pounds per acre of a copper lime dust.

1937 Results with Dusting and Spraying Sugar Beets

<u>Harvest Date</u>	<u>Treatment</u>	<u>Wt. of Tops</u>	<u>Tons per Acre</u>	<u>Sugar%</u>	<u>Purity of Juice</u>
Sept. 19th -	Dusted	1# 8 oz.	9.3	16.8	89.8
	Not sprayed	0# 13 oz.	8.0	15.6	87.4
Oct. 5th -	Dusted	1# 7½ oz.		17.1	66.7
	Not Dusted	0# 14 oz.		15.8	85.2
Oct. 15th -	Dusted 3 times		10.2 tons	16.7	87.9
	Sprayed 3 times		9.4 "	15.8	88.1
	Not Sprayed		8.4 "	15.0	86.6
Oct. 29th -	Dusted 3 times		11.05 "	16.0	84.4
	Sprayed 3 times		10.42 "	15.2	85.4
	Not Sprayed		9.33 "	14.4	83.2

Similar results were obtained on Charles Baker's farm where one spraying gave the following:

Sprayed areas	11.1 tons per acre	- 14.6% sugar
Not sprayed	10.5 " " "	- 13.4% "
Increase	.6 " " "	- 1.2% "

Our conclusions from these tests and previous experiences are:

1. Gains for dust and spray are quite marked in years when Cercospora occurs and in Ontario these have been severe in 3 years out of 8 years and moderate in the factory areas half the number of seasons, during recent years.
2. Dusting gives as good or better results than wet spray, and is put on with a fraction of the labor, though at present prices, the dusts cost twice as much as the materials for a wet spray.
3. Three dustings take about 100 lbs. of material per acre and costs the equivalent of 2/3 of a ton of beets or 1½% more sugar in the average crop yield.
4. The wet spray is impracticable under most local conditions due to
  - (a) Lack of adequate and handy water supply on many farms.
  - (b) Rush of grain harvesting and threshing when spraying should be done.
  - (c) Time taken to clean out the nozzles which plug with lime and pipe flakes.
  - (d) Necessity of spraying before infection is evident, to act as a preventative when the infections are not regular.
  - (e) The cost of machines and materials relative to the price received for beets.
  - (f) Repetitions of treatment necessary to protect the crop through a 6 week period when rain may wash off most of the spray at any time.
5. Dusting is more feasible and should be encouraged for small acreages at least, where hand equipment can be used. A cheaper material is necessary, however. Larger acreages would need to be handled by company or cooperative machines on an acre basis.
6. Humidities and crop growth in various localities should be recorded and bulletins should go along with a spray service to beet growers during the critical period, which in Ontario, is July 15th to August 30th.