

VARIETY APPROVAL “POINTS” SYSTEM BASED UPON YIELD, QUALITY, EMERGENCE AND RESISTANCE TRAITS

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Introduction

Sugarbeet yields have improved significantly in Michigan over the past ten years, however, quality levels have remained relatively constant. Our variety improvement efforts have focused on developing varieties with Rhizomania, Rhizoctonia and other disease resistance traits in addition to developing glyphosate tolerant varieties. Michigan Sugar Company has established new goals of improving yield and quality levels significantly over the next five years. We have evaluated several varieties with high yield and quality potential but these varieties have not been able to not pass our variety approval system. A new approval system has been developed which considers more traits and provides substantial incentives for improved quality. The Cercospora leafspot approval level has been changed in the new system so that varieties with less Cercospora resistance can be approved.

The new approval system considers sugarbeet yield, quality, emergence and tolerances to Cercospora, Rhizomania, Rhizoctonia and root aphid for approval. The previous system considered only sugarbeet yield, quality and Cercospora tolerance. Table 1 illustrates the differences between the new and old variety approval systems.

Table 1. Comparison of the New Points Approval System with the Previous Approval System (Values are % of Check)					
Year Enters OVT Trials	Variety	RWSA Minimum Level	RWST Minimum Level	Cercospora Maximum Level	Points Minimum Level
2009	old system	89.2	99.4	101.3	NA
2010-2014	new system	94.3	101.2	124.7	99.7
2015	new system	98.7	104.2	111.3	99.7

Description of Approval Process

Varieties receive approval points for RWSA (recoverable white sugar per acre, RWST (recoverable white sugar per ton), sugarbeet emergence and tolerance to Cercospora, Rhizoctonia, Rhizomania and root aphids. The points are totaled and a variety needs to reach 99.7 percent of the check varieties and meet the RWSA, RWST and Cercospora levels to become fully approved.

RWSA (% of check) is the starting point. The RWSA value equals the points gained. For example, if a variety has an RWSA value of 105% it receives 105 approval points.

For RWST, the difference from 100% is multiplied by 3 to determine approval points. For example, if a variety has an RWST level of 104%, it would receive 12 points (104 – 100 X 3 = 12). Varieties with RWST values below 100 receive negative points. This provides an incentive for seed companies to breed for high quality.

Cercospora ratings are converted to percent of check and points are determined from a conversion table. Varieties receive from 10 to -18 approval points in this category with very good tolerance gaining 10 points and very poor tolerance receiving -18 points. The relationship between the Cercospora level and points gained is relatively proportional in the positive portion of the scale (10 to 0) but becomes increasingly punitive as the Cercospora level climbs to the highest acceptable level (0 to -18). Four Cercospora nurseries are conducted in Michigan.

Two Rhizoctonia trials are conducted in Michigan and one trial is conducted at Ft. Collins, CO. Varieties receive from 0 to 10 points based upon their resistance level to Rhizoctonia. Points gained are relatively proportional to the disease level.

The root aphid nursery is conducted in Shakopee, MN. This is a greenhouse trial which rates varietal tolerance to root aphids using a 1 to 4 scale. In the approval process varieties receive from 0 to 5 points depending upon their tolerance to root aphids.

Rhizomania trials are conducted in Salinas, CA. For approval, the range of the nursery is divided into five equal sections and from 1 to 3 approval points are assigned.

Emergence values for varieties are determined in the Official Variety Trials. Varieties receive from -5 to 5 points depending upon percent emergence. Only varieties which were tested using commercially prepared seed are considered. Varieties that do not have commercially prepared seed receive 0 points, which is a mid-point rating.

The points approval system has been in effect for one season and six varieties are on approval track with point totals ranging from 107 to 126 points. Two of the new varieties have good Rhizoctonia tolerance and one has nematode tolerance. Table 2 illustrates how current Michigan varieties would fare in the points approval system. The specialty varieties are an average of our top five producing varieties. Two of these varieties have tolerance to sugarbeet cyst nematodes. These varieties have poor disease tolerance and did not receive full approval in the old system but would in the new system. Five fully approved varieties with moderately high yield and quality and good disease tolerance would receive full approval in the new system.

Table 2. Evaluate High Yield, High Quality and Poor Disease Varieties (Specialty Approval) and Fully Approved Varieties with Moderate Yield, Moderate Quality and Good Disease Tolerance in the “Points” Approval System									
Approval Type	RWSA	RWST	Cercospora	Rhizoctonia	Rhizomania	Root Aphid	Emergence	Total Points	% of Check
Specialty Approval	113.1	19.7	-4.8	3.2	2.5	2.2	0.2	136.1	118.6
Full Approval	95.3	5.7	5.6	5.4	2.5	2.2	-0.6	118.9	103.8

These varieties will not be considered for approval in the new system because they were entered into our OVT program prior to 2010.

The high yielding high quality varieties have produced very well in fields with low to moderate levels of Rhizoctonia. Growers cannot control Rhizoctonia with these varieties if planted into severely infected fields. Cercospora can be controlled by following recommended spray schedules. Fully approved varieties with good disease tolerance will out produce the high yielding varieties in fields with high levels of Rhizoctonia. Growers and agriculturalists know which fields need a disease tolerant variety in most cases.

Extensive research programs have demonstrated that Cercospora and Rhizoctonia can be controlled when growing varieties with poor disease tolerance. Michigan Sugar Company growers must agree to follow spray schedules set forth by the Cooperative when purchasing varieties that lack sufficient disease tolerance.

High yielding high quality varieties are needed to achieve the production goals necessary to improve profits for growers and for the Cooperative. The new "Points" Approval System will make it possible to approve high yielding and high quality varieties which will help Michigan Sugar Company to achieve our production goals.