RUTGERS COOPERATIVE EXTENSION

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

Demonstration and Evaluation of Integrated Crop Scouting On Pumpkins in Southern New Jersey

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For several years the ***Rutgers Vegetable IPM Program*** has been developing and testing a protocol for scouting pumpkins for growers in the northern part of the state. The research and on-farm demonstrations revealed the potential for pesticide reductions as a result of scouting fields and treating at recommended threshold levels of insects and diseases. Due to the successes of the program in the northern part of the state, an EPA grant was obtained to demonstrate the effectiveness of the program to pumpkin growers in the southern counties. The objective of the project was to utilize on-farm demonstrations to evaluate jack-o-lantern type pumpkins managed according to the IPM scouting protocol compared to the same variety treated according to the grower's usual practices. The differences between the management schemes would be evaluated through measurements of yield, quality, and field pest levels.

Materials and Methods

Five growers representing Cumberland, Gloucester, Burlington, and Monmouth counties were enlisted for the demonstration project and a total of six comparison blocks were established. Side-by-side comparison blocks were established within fields of the same variety and planting date on all but one farm, where a spatially separate field of the same variety and planting date was used for comparison. One of the five farms had two fields for comparison blocks. At this farm the grower wanted us to evaluate a field of powdery mildew susceptible varieties to a field of resistant varieties. Soil and nematode samples were taken from all fields prior to or shortly following planting.

Twice weekly field scouting began at plant emergence in both the IPM and the conventional blocks. Up through the 4-leaf stage 50 plants were examined primarily for cucumber beetles, squash bugs, and aphids. After the 4-leaf stage field scouts recorded the numbers of leaves (2 per plant on 5 plants in 10 random locations in the field) infested with spider mites and/or aphids, the number of squash bug nymph groups or egg masses per 5 plants, and the number of leaves with powdery mildew lesions. In addition, the presence or absence of other insects and diseases were noted including leafhoppers, thrips, aphids, cucumber beetles (and rind damage), bacterial leaf spot, gummy stem blight/black rot, virus symptoms, downy mildew, and phytophthora. Once the fungicide schedule was initiated, fields were monitored once a week until growers were finished spraying the fields. The Monmouth County demonstration field was scouted and managed by the local private consultant, *Frank Spiecker of* ***Garden State Pest Management***, in consultation with the Rutgers IPM Program. All other fields were scouted and managed by the Rutgers IPM Program in consultation with the county agents.

The protocol for the IPM blocks was to initiate fungicide applications when the powdery mildew threshold was exceeded (1 lesion per 50 mature leaves) and to treat on a 7-10 day schedule with Bravo + Nova alternated with Quadris or Flint. Other changes or modifications to this schedule were recommended based on the scouting results. No insecticides were recommended unless threshold levels were exceeded. Modifications to the fungicide schedule included Acrobat if phytophthora was present and copper fungicides if bacterial diseases were present. Fields were scouted for downy mildew and the disease was tracked regionally through the North Carolina State University Cucurbit Downy Mildew Forecast web site.

Two methods were used to evaluate yields in the IPM and conventional blocks. For three of the six fields (Glouc 1–Merlin, Monmouth, Cumb) three representative 30-foot square blocks were selected and marked out for harvest in each of the IPM and conventional blocks. In a narrow field (Glouc 1-Autumn King), three 12 by 15 feet representative blocks were marked out in both IPM and conventional treatments. Marketable pumpkins were harvested and weighed two times to determine the total marketable yield. The yield from the Glouc 2 IPM field was determined from grower calculations of the number of bins harvested. No yields were available from the Burl field and the Glouc 2 conventional field.

Results and Discussion

Only three of the six IPM plots were treated differently from the conventional plots (Table 2). The other three growers deferred to the IPM recommendations on both the conventional and IPM fields, resulting in no differences between the treatments. One fungicide application and two insecticide applications were eliminated on two of the IPM plots, and two insecticide treatments were reduced on the third IPM plot. No statistically significant differences in marketable yield were observed when means were compared within each location (Table 1). Additionally, the soil and nematode samples did not reveal any differences between the conventional and IPM blocks in any of the fields.

Powdery mildew was found on all farms, exceeding threshold levels between 7/20 and 7/27 except for the Burl location (Table 2). Fungicide schedules were initiated within a few days of threshold levels for most of the farms. Vine run occurred 11 to 16 days prior to the onset of powdery mildew for most of the fields. If fungicide treatments had been initiated at vine run, which is the standard recommendation, an extra one to two applications may have been applied on the Gloucester and Cumberland farms. On the Monmouth farm the initiation of the fungicide schedule was delayed 28 days from vine run, which amounts to potential savings of 4 weekly fungicide applications.

Three of the six fields were treated when powdery mildew reached threshold levels, with no differences in application timing in the IPM versus the conventional blocks. On the Glouc 1 farm, the conventional plots were treated prior to the onset of powdery mildew, resulting in one extra application compared to the IPM blocks (Table 2). At this farm there was only a 4-day delay between the onset of powdery mildew in the resistant variety compared to the susceptible variety. However, at the first observation of PM the susceptible varieties had 13/100 mature leaves with at least one PM lesion compared to a level of 3/100 leaves in the resistant varieties. Foliar infections were lower in the resistant varieties for the rest of the season as well. The number of leaves with PM lesions did not exceed 4/100 in the resistant varieties compared to a high of 30/100 leaves in the susceptible varieties.

Modifications to the fungicide schedule were made for some farms. The levels of phytophthora were low on most of the farms, but when phytophthora began to appear on other cucurbits in the area Acrobat or copper fungicides were added to the schedule. At the Burlington site, a combination of excess rainfall following irrigation, and the inability of the farmer to maintain a regular fungicide spray schedule, resulted in plant decline and reduced fruit quality and likely reduced yield, although yield data was not available from this site. At one farm, the demonstration blocks were treated preventatively with copper fungicides when bacterial leaf spot was seen in another field on the farm. Viral symptoms were found on two farms, and the samples screened were shown to have potyvirus and watermelon mosaic virus 2.

Some insecticide reduction was demonstrated. Two insecticide applications were eliminated on 3 of the 6 IPM blocks, and as many as 6 additional treatments potentially could have been reduced (Table 2) if action thresholds were observed. Two fields that did not receive an at-planting soil insecticide later developed threshold populations of cucumber beetles (Burlington) and spider mites (Glouc 2). In the fields that received soil insecticide at planting (imidacloprid primarily), cucumber beetle populations as well as other insects and mites were low throughout most of the season. Two-spotted spider mites began early in both of the Gloucester fields, and exceeded threshold on the Glouc 2 farm. The Glouc 1 farm applied materials to both the IPM and conventional blocks to reduce mite levels. Some cucumber beetle treatments were applied later in the season to prevent rind injury, but adult levels were low in most of the fields.

Because we were working on commercial farms rather than on a controlled research farm adjustments were made to meet the needs of the growers. For some of the farms it became logistically difficult to treat the IPM plots separately. Additionally, the recommendations for the IPM plots influenced the management of the conventional plots on some farms so that no differences in plot treatments were observed.

Conclusions

As shown in studies in the northern part of the state, the primary threat to pumpkin health is from foliar diseases, particularly powdery mildew. Disease scouting and treating when powdery mildew exceeded threshold levels resulted in a decrease of 1 to 4 fungicide applications when compared to the standard treatment of initiating applications at vine run. As many as two insecticide treatments were reduced in some of the IPM blocks, with no resulting yield effect. Further insecticide reductions may be possible, especially if the results could be demonstrated over several years under varying pest pressures. In general, scouting for diseases and insects in pumpkins has an immediate potential for pesticide reduction as well as improved application timing and choice of materials. Growers were positive about the results of the demonstration project, and at least one of the five farms is interested in having private consultants scout his pumpkins next year. Two growers liked the benefits of regular scouting, but wanted to see the cost advantages over a few years. The protocol developed for the North Jersey Pumpkin IPM Program is applicable to South Jersey pest conditions as occurred for the 2001 field season.

Table 1. Summary of yield data.

Location	Variety	Planting Date	Plot	Average Weight (lbs)	Marketable Yield (tons/A)
Glouc 1	Merlin	6/14	Conv.	10.4 ns	25.42 ns
			IPM	12.3	23.18
Glouc 1	Autumn King	6/14	Conv.	17.7 ns	18.80 ns
			IPM	17.8	16.52
Glouc 2	Howden	6/13	Conv.	-- --	-- --
			IPM	--	16.23
Cumb	Howden	6/11	Conv.	14.3 ns	17.32 ns
			IPM	16.6	21.64
Monmouth	Howden	6/20	Conv.	13.1 ns	7.13 ns
			IPM	12.5	8.67
Burlington	Magic Lantern	6/20	Conv.	--	--
			IPM	--	--

Means were compared within location using ANOVA and were not significantly different (P>0.05)

Table 2. Summary of disease and insect results.

Location Variety	PM over thresh.	Days from vine run	Plot	1st PM trtmt	# Foliar Fungicide Applications	# of Foliar Insecticide Appls.	# Times Insects Over Threshold
Glouc 1 Merlin[2]	7/24	12	Conv.	7/18	**8**	**8**	0
			IPM	7/24	**7**	**6**	0
Glouc 1 A. King	7/20	12	Conv.	7/18	**8**	**8**	0
			IPM	7/24	**7**	**6**	0
Glouc 2 Howden[1]	7/24	11	Conv.	7/28	6	**3**	2
			IPM	7/28	6	**1**	1
Cumb Howden	7/23	16	Conv.	7/25	6	2	0
			IPM	7/25	6	2	0
Mon. Howden	7/27	28	Conv.	8/17	4	0	0
			IPM	8/17	4	0	0
Burl. M. Lantern[1, 2]	8/6	7	Conv.	8/20	3	2	2
			IPM	8/20	3	2	2

[1] No at-planting soil insecticide

[2] Powdery mildew (PM) resistant variety

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