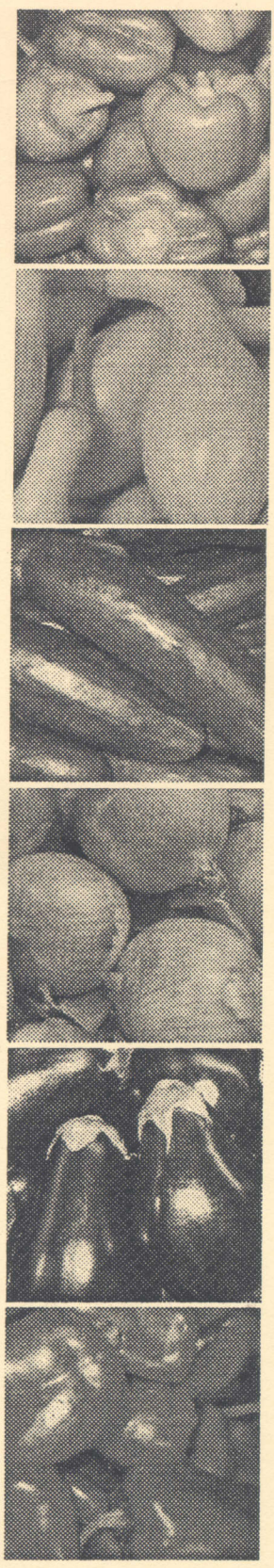

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FRUIT PAPERS

IPM Strategies for Peaches

Wheeler Foshee, Robert Boozer, John McVay, Edward Sikora, and Jason Burkett

Integrated pest management (IPM) strategies for peach production are yet to be fully developed in the southeastern United States. IPM involves the management of pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. IPM studies have shown promise in better timing of pesticide applications and reduction of sprays (Gorsuch & Miller, 1984; Johnson, 1989, 1996; McCraw, 1997).

A study was initiated in 1997 to develop IPM strategies for Alabama at the E.V. Smith Reserach Center. The purposes of this study were to (1) develop trapping techniques, (2) determine thresholds for sprays, and (3) reduce unnecessary pesticide applications.

A block of 'Correll', 'Sunland', and 'Biscoe' peaches, representing early to late season varieties, was used to study IPM techniques versus standard calendar spray schedules. Data collected included pheromone trap catches for plum curculio, Oriental fruit moth, peachtree borer, and stinkbugs and non-pheromone trapping for plum curculio and tarnished plant bugs. Damage ratings for all insect and diseases were taken at harvest. In addition, a seven-day post-harvest examination was conducted for diseases.

Preliminary results indicated that damage by plum curculio (PC) and catfacing insects was worse in the later varieties over this two-year period (see table). An analysis of the treatments by variety showed that there were no differences in the IPM vs. the standard treatment in regards to insect control except in 1999. During this year, the late variety ('Biscoe') had a significantly higher number of PC-damaged fruit. All other insect evaluations showed no differences. It appears that the IPM spray schedule, which reduced the amount of insecticide sprays by one to two sprays ('Correll' and 'Sunland', respectively) gave adequate control for PC.

Post-harvest evaluation for diseases revealed that the later varieties had more disease pressure. However, both years were very dry and no conclusive trends were observed. The potential utilization of IPM practices in peach production looks promising for insect pests; however, control strategies for insects and diseases need further study before shifting producers from the standard spray schedule.

Damage to Peaches by Plum Curculio and Catfacing Insects

	% Damage			
	Plum curculio		—Catfacing—	
Variety	1999	2000	1999	2000
Correll	0.0 a	1.6 a	3.0 a	1.6 a
Sunland	0.0 a	4.4 b	4.2 a	4.4 b
Biscoe [1]	17.8 b	—	8.5 b	—

[1] Variety had no yield in 2000 due to freeze event.
Numbers within columns followed by the same letter are not significantly different ($P \leq 0.05$, DMRT).

Effect of 'HyperActive' Spray Additive for Pest Control in 'Harvester' Peaches

Robert Boozer and Jim Pitts

Several factors contribute to the difficulty peach producers have in making consistent profits in the Southeast. The loss of pesticides that provided excellent control at economical levels, the continued increase in the cost of labor, and all other inputs are major contributing factors. It is unlikely that the cost of materials used in pest control will be reduced; therefore, costs can only be reduced by using less material per acre or by using less volume of water per acre. Reducing the amount of water used per acre would lessen the amount of time needed to make spray applications, the time needed for fill-ups, and the number of fill-ups. All these relate to reduced man-hours and thus decreased labor costs.

A study at the Chilton Area Horticulture Station was designed to evaluate the effectiveness of 'HyperActive' spray adjuvant in reducing total spray volume per acre commonly used in peach production in the Southeast. Major pest concerns were plum curculio, peach scab, and peach brown rot.

In March, a block of 'Harvester' was set up in a randomized complete block design with three replications per treatment. Treatments of spray volumes were as follows:

1. 50/75 gallons per acre + HyperActive
2. 100/140 gallons per acre + HyperActive
3. 50/75 gallons per acre + FarmWorld Surfactant
4. 100/140 gallons per acre + FarmWord Surfactant
5. Non-sprayed control

Lower spray volume rates were used from bloom up to May 1. Higher spray volume rates were used after May 1 and continued to harvest. Fungicides and insecticides were the same for all treatments and were applied at equivalent rates of active ingredient per acre. Standard spray volume was represented with initial use of 100 gallons per acre and shifted to 140 gallons per acre in full cover sprays.

First harvest was made on June 12 and 50 fruit were collected from each data tree for evaluation of peach scab, brown rot, and insect injury. Insects were identified by type of pest—plum curculio, stinkbug type, or chewing (grasshopper or other). Twenty-three fruit were randomly selected to be used for a seven-day post-harvest evaluation of brown rot and rhizopus rot.

Degree of insect injury was not significantly different between treatments, and fruit damaged averaged 4.7% for the study. The greatest amount of injury occurred from chewing insects and the least from plum curculio. Peach scab infected 67.4% of the nonsprayed fruit and was significantly higher than all other treatments (see table). Brown rot was not a problem with any fruit at harvest and there were no significant differences after the seven-day post-harvest evaluation.

OCCURRENCE OF DISEASE AND INSECT INJURY TO 'HARVESTER' PEACH RELATED TO SPRAY VOLUME AND USE OF 'HYPERACTIVE' SPRAY ADDITIVE

	% Damage			
Treatment	Peach scab	Plum curculio	Stinkbug	Chewing
50/75 H	13.0 b	0.0 a	4.6 a	5.4 a
100/140 H	8.6 b	0.0 a	6.6 a	8.6 a
50/75 FW	14.0 b	2.6 a	8.6 a	11.4 a
100/140 FW	9.4 b	0.0 a	3.4 a	4.0 a
Control	67.4 a	1.2 a	4.6 a	7.4 a

Numbers within columns followed by the same letter are not significantly different ($P \geq 0.05$, DMRT).

Due to the extremely dry season, disease pressure was minimal. Even though more than 65% of the fruit within the non-sprayed treatment were infected with peach scab, the degree of infection would not have prevented many fruit from being marketed. While not significant, the higher spray volumes reflected a trend to improve protection against peach scab. The additive, 'HyperActive', did not improve effectiveness of pesticides compared to FarmWorld Surfactant.

PURSUING A BETTER UNDERSTANDING OF PLUM CURCULIO IN PEACHES

Robert Boozer, Wheeler Foshee, Jim Pitts, and John McVay

One of the major pests of peach, *Prunus persica* (L.) Batsch, is the plum curculio (PC), *Conotrachelus nenuphar* (Herbst). While adults feed on the surface of the fruit, larvae feed within the fruit and around the pit area. The term "wormy" fruit came about as a result of the presence of the PC larva in the fruit at time of consumption. The fear of having "wormy" fruit is the major driving force behind insecticide applications for peach growers throughout the southeastern peach-producing states. Limited knowledge of PC activity—from their emergence in the spring to the harvest of the last peach in late summer—results in eight to sixteen insecticide applications on a weekly or biweekly schedule.

To reduce pesticide applications and other inputs, a better understanding of PC presence in peach orchards is needed; this can be accomplished through modeling, monitoring, and management. Modeling involves finding an outside influence affecting the life cycle and activity of PC, such as temperature, and developing a high correlating temperature/biological relationship based on degree days. Several insect pests have been successfully modeled, which greatly improves the judicious use of insecticides. Modeling is a predictive tool that does not stand alone but in combination with monitoring. Monitoring can be both the routine observing of damaged fruit alone and the monitoring of adults. Limb jarring has been the recommended method to detect the presence of adult PC. In the early 90s, Dr. Tedder, USDA Entomologist, developed what has come to be called the "Tedder's" trap. This trap utilizes the insect's sense of sight to draw them to the trap, which captures them for monitoring. An orchardist in one of the Western States developed the "Circle Trap," which uses existing tree trunks within the orchard to monitor adult activity. With better understanding of PC and better monitoring of PC activities, better decisions can be made with regard to PC management.

A study was begun in 1994 to monitor PC emergence and activity throughout the growing season in an unsprayed orchard block; in addition, this work evaluated trap designs for improved monitoring of adults. The goal was to correlate temperature data with adult PC activity to establish a degree-day model to be used as a predictive tool for increasing the efficient and effective use of pesticides for control of PC in peaches.

The study was located at the Chilton Area Horticulture Station (CAHS). A chemical-free block was used for the experiment to work with unbated PC. "Tedder's" traps as well as other trapping methods have been used each year to evaluate effectiveness.

Traps were installed about March 1 of each year and monitored two to three times per week. Four to six traps were arranged so that half the traps were within the tree row border next to woodland border and the remaining half were 40 feet within the orchard. Plum curculio adults caught in traps were examined for first egg-bearing females (Dr. Dan Horton, UGA).

Daily temperature readings were collected from a Campbell Remote Weather Station located at CAHS approximately 200 yards from the study. Climatic data consisted of daily rainfall and soil and air temperature readings.

Over-wintering adult PC can begin to migrate in February, but most of the activity occurs during March. Total number trapped can vary greatly from year to year. The highest number of PC trapped in the month of March came during 1995,1994,and 2000, which were 125, 120, and 111, respectively. Lowest PC trappings for March occurred in 1997, the year following one of the worst peach crops in Central Alabama in 40 years.

PC were most active during bloom. When first bloom was used as a starting point to calculate degree-days, which used a base of 50^0 F (DD_{50}), the first major captures occurred within 50 to 80 DD_{50}. Daily PC activity was affected by daily temperatures. When daily temperatures produced DD_{50} of 10 or less, the number of PC captured during that period dropped. When there were two or more days with DD_{50} above 10, PC captures increased. Daily temperature effects on PC activity can be seen for both March and April.

First egg deposition occurred around 245 DD_{50} and larvae hatched approximately 75 DD_{50} after deposition of eggs. Total number of PC varied by year, but over-wintering PC activity declined in the field each year when approximately 1000 to 1100 DD_{50} were reached. First generation adult PC began to emerge shortly later at 1200 to 1300 DD_{50}.

Detailed activity of adult PC, egg deposition, larvae hatch, fruit fall, and emergence of first generation PC was made for the 2000 season. From data collected, days following first bloom were separated into weekly periods and the total PC captures and average DD_{50} were calculated for each week for major events. Using the DD_{50} calculations and applying them to other years indicates a very close association with PC activity, especially the decline of over-wintering adults and the start up of first generation PC adults (see table).

While trapping PC in an unsprayed peach orchard has been relatively easy, trapping PC under grower conditions has not proved very successful. Low PC numbers and insecticide applications greatly reduce the effectiveness of the "Tedder's" trap method in monitoring within grower orchards. Placement becomes critical and often a full season can elapse without capturing a single PC. By correlating PC activity with degree day accumulation from first bloom, more precise insecticide applications can be made to prevent fruit damage and potentially reduce unnecessary insecticide applications. Materials with better control and residual for PC and with limited applications per season can be utilized during the expected period of first egg deposition and hatch for over-wintering PC and during the period following first generation emergence.

More work needs to be done to further refine the degree day approach to better understanding PC activity in peach orchards. The evaluation of insecticide applications based on this approach and the resultant level of damage will also have to be evaluated. The grower's great concern about preventing any "wormy" fruit sold to the consumer makes IPM more difficult but not impossible.

RELATIONSHIP OF WEEKLY PLUM CURCULIO TRAP DATA FOR SELECTED YEARS AND WEEKLY DEGREE DAY (BASE 50) ACCUMULATION

Year	Week 1 [1]	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
1994	0/47	9/82	76/175	35/199	22/249	79/358	34/476	67/625
1999	0/9	0/57	0/85	6/206	8/347	0/401	2/544	0/636
2000 [2]	1/50	48/107	31/154	29/230	14/308	21/369	14/308	21/369
Year	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	
1994	28/720	44/856	24/976	19/1113	42/1284	79/1477	135/1672	
1999	13/773	4/902	2/1053	3/1202	8/1398	8/1591	0/1740	
2000	10/456	16/520	0/640	13/810	4/970	2/1153	3/1322	

[1] BioFix was early bloom.

[2] Fruit drop (520 DD_{50}), end of overwintering PC (1150 DD_{50}), first generation PC (1320 DD_{50}).

USE OF PYRETHROIDS FOR PEST CONTROL IN PEACHES

Robert Boozer, Wheeler Foshee, and Jim Pitts

Recent losses and label changes of major insecticides for pest management in peaches have growers and specialists concerned about future pest control measures in orchards. In late 1991, ethyl-parathion, the principal insecticide utilized for pest management was banned by EPA. In late 1999, EPA banned the use of methyl-parathion and at the same time reduced the amount of azinphos-methyl "Guthion" which could be used per acre. Unaffected and basically unused by growers was phosmet "Imidan" insecticide. Not only were growers concerned as to the effectiveness of "Imidan," but the cost was nearly twice as much as previously used insecticides.

Several pyrethroids have been recommended. Growers have not used these products because of their concern for "flaring" mites (increasing numbers of spider mites). The primary mite species in peach orchards in the Southeast is the two-spotted spider mite, *Tetranychus urticae* (Koch).

Evaluating the use of a pyrethroid alone or in combination with a miticide, as part of an overall pest management program, was the purpose of the 2000 study. The study was designed to compare cover sprays of organophospates to pyrethroid and the incidence of two-spotted spider mites. Mite control strategies were set up to be used if needed.

A grower block of 'Stagg' was used for the study. Treatment plots were 60 feet wide and 80 feet long. Treatments evaluated included (1) Guthion 50W or Imidan 70W full season, and (2) Pounce 3.2EC full season. Treatments for spider mite control if warranted included Apollo SC full tree, Apollo SC half tree, Capture 2EC, and Oil (emulsified silicone, 0.5% and 1.0%) applied to Pounce 3.2 EC plots. (Note: Capture 2EC is not currently labeled for use on peaches and fruit were already harvested when application was made.) All materials were applied at label rates using an air-blast sprayer delivering 150 gallons per acre. Fungicides were used in each cover spray and consisted of Captan 50W and Sulfur 90S at recommended rates.

Counts for each plot were made of total number of leaves infested with mites, total number of adult mites, and total number of eggs laid. Sampling for mite activity was made on a weekly basis from May 12 to July 11. Chlorophyll reading, tree damage rating, and leaf shed rating for each treatment were made on July 18.

Application of Apollo treatments, half tree and full tree, were made on May 22. Half tree was accomplished by closing off all spray nozzles except those directed to the lower half of the tree. Volume was not adjusted from normal calibration so spray volume was 40 percent of full tree. Capture 2EC and emulsified silicone treatments (0.5% and 1.0%) were made on July 18.

Two-spotted spider mites were present in low numbers when sampling began. The number of leaves with mites continued to increase over the course of the season with two major drops occurring shortly after two of four rain events. Adult mite numbers were erratic over the block. Total number of leaves with adult mites, total adults, and total egg numbers were not significantly different among treatments (Table 1).

Mite population variability within the block and maintaining the leaf sampling area within the lowest interior section of the tree appear to have influenced results. This seems to bear out when leaf chlorophyll readings, tree damage ratings, and leaf shed ratings were analyzed.

Highest chlorophyll readings occurred in Pounce cover sprays with an early application of either Apollo full tree or Apollo half tree. An additional Pounce cover spray treatment used later also had a high chlorophyll reading. Tree damage ratings were highest for the Guthion/Imidan treatment and lowest for the Pounce/Apollo full tree. Leaf shed ratings were also lowest for the Pounce/Apollo full tree, but not significantly lower than Pounce/Apollo half tree (Table 2).

The use of a pyrethroid (Pounce) in cover sprays did not increase the number or degree of damage to peach trees compared to using Guthion/Imidan cover sprays. Under extreme drought conditions such as were experienced during the 2000 season, both insecticide programs "flared" two-spotted spider mites and the use of a miticide was needed. Evaluation of Apollo-full-tree and half-tree applications where Pounce was used in cover sprays effectively controlled two-spotted spider mites. This was evidenced by chlorophyll readings as well as tree damage ratings and leaf shed ratings. Weekly sampling for two-spotted spider mites did not bear this out; however, if the location of leaf collection for mite activity were taken progressively higher

TABLE 1. CUMULATIVE TOTALS: LEAF INFESTATIONS, ADULT MITES, AND EGGS, MAY 12 TO JULY 11

Treatment	Leaves infested	Adult mites	Eggs
Guthion/Imidan	56	185	63
Pounce	63	140	83
Pounce/Apollo (full tree)	42	90	77
Pounce/Apollo (half tree)	58	182	129

within the canopy, results would likely be significant. The Pounce alone cover spray treatment, which had a high chlorophyll reading also, had the highest leaf shed rating and a high tree damage rating. The high chlorophyll reading is likely due to high leaf shed, leaving healthier greener leaves remaining on the tree at time of sampling.

This study does not take into account the potential pest problems that could build up, such as white peach scale or San Jose scale, if a pyrethroid were used in repeated seasons. The study did show that mites could be managed in a pyrethroid program with the use of Apollo SC. Future work will examine the Apollo SC - half tree application and emulsified oil - 1% more closely in addition to scale insect activity.

Table 2. Mite Damage Indicated by Chlorophyll Reading, Tree Damage Ratings and Leaf Shed Ratings as Influenced by Insecticide Treatments

Treatment	Chlorophyll reading	Tree[1] damage	Leaf[2] shed
Guthion/Imidan	40.2 c	4.3 a	4.3 a
Pounce	42.7 b	3.3 ab	4.7 a
Pounce/Apollo (full tree)	44.1 a	0.7 c	0.7 b
Pounce/Apollo (half tree)	44.3 a	2.3 b	1.3 b

[1] Subjective ratings (0 - 5), where 0 = no damage to tree and 5 = high number of speckled leaves, interior shoots devoid of leaves.
[2] Subjective rating (0-5), where 0 = no leaves shed and 5 = 40 - 50% shed
Numbers within columns followed by the same letter are not significantly different (P=0.05, DMRT).

Grower Evaluation Trials for ReTain Use on Peaches in Central Alabama— 2000

Robert Boozer

The use of ReTain on peaches, *Prunus persica* L. (Batsch), has been evaluated in controlled trials by several researchers in the Southeast. Results have been very consistent from reports given. To evaluate ReTain under grower conditions, several grower trials were planned for 2000. Random sampling would be conducted to generate technical data, but feedback from the growers was desired. Growers selected varieties that they believed would benefit from increased firmness and from any maturity delay that might occur.

Growers performed all management needed for production and pest management. Based on anticipated harvest date by the growers, ReTain was applied to achieve a seven-day pre-harvest treatment. Due to varied conditions for fruit maturity, applications were actually three to eight days before harvest. Three varieties were selected, 'Loring', 'Jefferson', and 'Encore'. ReTain was applied at 50 gallons active ingredient per acre with nonionic surfactant at 0.125%. Total spray volume was 150 gallons per acre. Harvest was accomplished by farm labor and sub samples were taken from numerous areas within each treated and nontreated block. Number of fruit were sufficient to be used for at-harvest and all post-harvest evaluations. Evaluations consisted of individual fruit size, firmness (both cheeks), and soluble solids at harvest and after three to ten days following cold storage.

Grower Trial No. 1, 'Loring': Pre-harvest application of ReTain on 'Loring' occurred on June 21, six days before first harvest. Grower labor and picking standards (size and color) were utilized for all harvests. Fruit samples needed for data collections were obtained randomly from lugs prior to loading on trailers. Fruit samples were taken to represent the entire area of both treated and untreated blocks with sufficient number for all evaluations. Evaluations included fruit firmness, size, percent soluble solids, and repeat of these parameters after cold room storage.

Results of at-harvest evaluation were similar to previous work. Some gain in pressure and slight reduction in fruit size was noticed within at-harvest samples. Improvement in fruit firmness was not consistent between harvests. Cold room storage was not improved by the use of ReTain and samples lost firmness at basically the same rate.

Grower Trial No. 2, 'Jefferson': ReTain was applied on July 6 at 50 gallons active ingredient per acre and 150 gallons finished spray volume. Two blocks were set up consisting of approximately 1.5 acres per block. Tree rows ran east to west. The ReTain-treated block was located on the west side and untreated on the east. First harvest was initiated July 14, eight days after ReTain treatment. Grower labor harvested fruit based on standard criteria of size and color. Twenty-five randomly selected fruit from harvest lugs were collected representing entire block for both treated and untreated areas to be used for data collection. This process was utilized for each of three harvests.

Data for 'Jefferson' consisted of fruit firmness and size. Percent soluble solids and cold room storage evaluation was not applied to this variety. ReTain treated fruit were firmer and slightly smaller than untreated fruit.

Grower Trial No. 3, 'Encore': Pre-harvest application of ReTain was made July 17 to approximately 1.5 acres. Untreated 'Encore' also consisted of approximately 1.5 acres. First harvest was made July 20, only three days after ReTain had been applied. A total of four harvests were made, the last harvest occurring

July 31. Harvest and fruit sample collection was accomplished as stated in previous trials.

Fruit evaluation of firmness, size, and percent soluble solids were made at-harvest and after cold room storage. Results were variable between harvests for each of the parameters evaluated.

Results from all trials were somewhat mixed, but the results were consistent with other work being done. ReTain consistently benefits fruit firmness in one or two harvests during the entire harvest period when applied from three to eight days prior to first harvest. The increase in firmness ranged from 1.42 to 2.54 pounds and accounted for improvements in six of eleven harvests made to the three peach varieties evaluated. The most consistent increase in fruit firmness occurred with 'Jefferson', in which all three harvests showed significantly higher fruit firmness with ReTain over untreated control. This may indicate varietal differences with respect to response to ReTain. The varieties, 'Loring' and 'Encore' tend to soften more quickly during the maturation process than 'Jefferson'.

Fruit size as affected by ReTain was variable and did not seem to correlate with whether fruit firmness was improved or not. It has appeared that for the past two years, there was a consistent but minimal reduction in size as a result of the use of ReTain. While these observations are supported by the results from 'Loring', they are not supported with results from 'Jefferson' and 'Encore'.

Sugars as measured by percent soluble solids do not seem to be influenced by the use of ReTain. The same seems to be the case for fruit held in cold storage. The degree or rate of softening that occurs during cold storage appears to affect both treated and untreated fruit about equally. The relative difference between fruit firmness of ReTain treated and untreated fruit remains about the same after identical exposure to post-harvest cold storage temperature and duration.

Grower comments were part of the objectives of these trials and not surprisingly showed interest, but no real excitement. The potential to delay harvest and/or increase firmness excites most peach producers. The beneficial results of these trials were not sufficient in magnitude to generate present adoption of this practice under the present protocol. However, growers would like to see the continuation of studies looking at other application times, rates, and perhaps multiple applications in pursuit of achieving a delay in fruit maturity with peaches similar to that produced by ReTain on apples.

EVALUATION OF CAPTAN/SULFUR TANK-MIXES FOR PEACH SCAB AND BROWN ROT CONTROL ON PEACHES

Edward Sikora and Jim Pitts

Peach producers in Alabama commonly use sulfur as part of their disease management program. To improve its effectiveness, and to keep costs relatively low, some growers tank-mix sulfur with the fungicide Captan for spraying during the cover period. How effective this program is in controlling peach diseases, and the relative ratio of sulfur to Captan needed for control, are still not clear. This reports outlines the results of the second year of a three-year study to compare two sulfur/Captan tank mix programs with the standard, full season cover spray programs of sulfur or Captan alone.

The experiment was conducted at the Chilton Area Horticultural Station near Clanton, Alabama, on the cultivar 'Alred Alberta'. Treatments consisted of cover spray programs of (1) Unsprayed control, (2) Captan 50 WP five pounds per acre, (3) Sulfur 80% nine pounds per acre, (4) Captan 50 WP three pounds

EVALUATION OF CAPTAN/SULFUR TANK-MIXES FOR PEACH SCAB AND BROWN ROT CONTROL ON PEACHES, CHILTON AREA HORTICULTURAL SUBSTATION, CLANTON, 2000

Fungicide cover spray program [1]	% Fruit w/t scab	% Marketable fruit	% Brown rot	% Rhizopus rot
Unsprayed control	69.5 b	58.0 b	1.5 a	2.5 a
Captan 50 WP 5 lb/ac	1.0 a	100.0 a	0.0 b	0.0 b
Sulfur 80% 9 lb/ac	0.0 a	100.0 a	0.5 ab	0.0 b
Captan 50 WP 3 lb/ac + Sulfur 80% 5.5 lb/ac	0.0 a	100.0 a	0.0 b	0.0 b
Captan 50 WP 2 lb/ac + Sulfur 80% 3.5 lb/ac	0.0 a	100.0 a	0.0 b	1.0 ab

[1] Bravo Ultrex was applied at shuck split and petal fall and two Orbit sprays were applied at seven and one day before harvest for all treatments except the control. A total of 40 fruit were picked from the center two trees of each treatment/replication. Percent of fruit with scab and percent marketable fruit was determined at harvest. Incidence of brown rot and Rhizopus rot was determined seven days after harvest.
Numbers followed by the same letter are not significantly different from one another.

per acre plus Sulfur 80% 5.5 pounds per acre, and 5) Captan 50 WP two pounds per acre plus Sulfur 80% 3.5 pounds per acre.

All the fungicide programs performed significantly better than the unsprayed control in terms of scab incidence and marketability of fruit (see table). There were no significant differences among the fungicide programs. Neither brown rot or Rhizopus rot were much of a problem this year due to dry conditions near harvest. The unsprayed control treatment had the highest level of brown rot and Rhizopus rot, whereas in most of the fungicide programs the diseases were not observed.

The lack of rainfall due to the drought of 2000 provided conditions unfavorable for peach scab, brown rot, or Rhizopus rot. In 1999, during the first year of the study, weather conditions were more favorable for these diseases to develop. Results from the 1999 test showed that spray programs consisting of Captan alone at five pounds per acre or Captan at three pounds per acre plus Sulfur at 5.5 pounds per acre had fewer fruit with scab lesions compared to the sulfur alone program or the low rate of the Captan/sulfur tank-mix.

Evaluation of Biofungicides for Disease Control on Peaches

Edward Sikora and Jim Pitts

This test was conducted to evaluate "new chemistry" biofungicides that have the potential to control a wide array of diseases on a broad spectrum of plants. In this study, two biofungicide products were evaluated at two different rates to determine their effectiveness in controlling peach scab, brown rot, and Rhizopus rot on peach when compared to the industry standard. In general, the biofungicide treatments performed better than an unsprayed control, but were not as effective as the standard spray program with regards to peach scab control.

The experiment was conducted at the Chilton Area Horticultural Station in Clanton, Alabama, on the variety 'Monroe.' The standard program consisted of two sprays of Bravo Weatherstik during bloom/petal fall, eight cover sprays of Captan, and two Orbit sprays at 11 and one day before harvest. The biofungicide treatments (QRD 132 and 137) were applied every 10 to 14 days throughout the season. Fruit were rated for scab incidence and severity (marketability) at harvest and for brown rot and Rhizopus rot after a seven-day storage period.

The only significant difference in scab incidence and fruit marketability was between the unsprayed control and the standard spray program (see table). There were no significant differences among the QRD treatments and the unsprayed control or the standard program with the exception of QRD 132 WP at eight pounds (% fruit with scab). The QRD 132 and 137 six-pound treatments had significantly less brown rot than the unsprayed control. There were no significant differences among the treatments with regards to Rhizopus fruit rot.

The industry standard provided excellent control of peach scab in this trial. The biofungicide treatments worked fairly well, but these products need to be tested further under conditions when peach scab and post-harvest disease pressure is high. Disease pressure in 2000 was relatively low due to the drought.

Evaluation Of Biofungicides For Peach Scab, Brown Rot And Rhizopus Rot Control On Peach, Clanton, 2000

Treatment rate/acre[1]	% Fruit with scab	% Marketable fruit[2]	% Fruit with brown rot	% Fruit with Rhizopus
Unsprayed control	51.5 a	71.5 b	4.9 a	1.8 a
QRD 132 WP 6 lb	20.0 ab	91.2 ab	1.2 b	1.2 a
QRD 132 WP 8 lb	43.7 a	80.6 ab	3.7 ab	1.2 a
QRD 137 WP 6 lb	36.3 ab	83.1 ab	1.2 b	0.0 a
QRD 137 WP 8 lb	24.7 ab	89.1 ab	3.1 ab	0.6 a
Standard program	0.0 b	100.0 a	3.9 ab	0.0 a

[1] Treatment consisted of Bravo Weatherstik (3.5 to five pints per acre) at bloom and petal fall, Captan 50 WP (five pounds per acre) during the cover period, and Orbit (four ounces per acre) at seven and one days before harvest.
[2] Fruit exhibiting only a few scab lesions are considered marketable.
Numbers followed by the same letter are not significantly different.

EVALUATION OF PEACH AND PLUM GERMPLASM FOR RESISTANCE TO *XYLELA FASTIDIOSA*

Robert Ebel and Bryan Wilkins

Plum species and peach selections were obtained from the National Clonal Germplasm Repository at the USDA-ARS at the University of California-Davis and the breeding program at the USDA-ARS S.E. Fruit and Tree Nut Research Lab, in Byron, Georgia, to test for their resistance to *Xylella fastidiosa*. The trees were budded at Cumberland Valley Nursery on 'Halford' peach rootstock in 1998.

The trees were planted in spring of 1999 at the Wiregrass Research and Extension Center, an area known to have a high native population of *Xylella fastidiosa*. Of the original 83 selections of peach and plum, 49 had four or more trees that survived budding and were planted in a randomized complete block design with four repetitions per block. Another 17 had one to three trees that survived, and these were planted in a separate block with trees of each selection adjacent to each other.

In August of 1999, the trees were double budded with buds from plum trees demonstrating symptoms of plum leaf scald. The budding method used was a modified shield bud where the bud used was actually a chip bud but this was slid into the bark of a **T** cut. This was done because the bacteria reside in the xylem and using a chip bud instead of a shield bud improves the likelihood of infection, even if the bud does not survive.

The trees were rated for symptom development of plum leaf scald or phony peach and for extent of defoliation in mid September of each year. There were no symptoms in 1999 since it takes about 18 months for symptoms to develop after initial infection. Some trees died during the early years due to failure of the bud union so that there were 43 selections left in the randomized complete block with three or more replications (with only four having only three replications).

In 2000, some plum leaf scald, as indicated by marginal necrosis, was demonstrated on some selections including dPRU0817 (Sp. Early Jewel), dPRU0891 (*Prunus cerasifera* Lindsaye), and dPRU0850 (Hybrid Morettini). In 2001, there were many more selections demonstrating symptoms consistent with plum leaf scald. Of the 43 selections tested, 28 had moderate to severe symptoms whereas 15 had less than moderate symptoms.There were no obvious symptoms of phony peach on any of the peach selections at anytime.

PEACH BLOSSOM THINNING WITH TWO SURFACTANTS

Robert Ebel, Bryan Wilkins, Robert Boozer, and Jim Pitts

Peach trees set too many fruit for optimum fruit size at harvest. As much as 95% of peach blossoms need to be removed to optimize profit in commercial peach orchards. This study was conducted to determine the efficacy of two surfactants in thinning peach blossoms.

The experiment was conducted at the Chilton Area Horticulture Station in Clanton, Alabama, on the variety 'Fireprince'. It was set up as a randomized complete block design with five blocks and single trees treated within each block. There were buffer trees between treated trees within each row, and there were buffer rows between treated rows to reduce contamination by spray drift.

FLOWER REMOVAL AND FRUIT GROWTH OF 'FIREPRINCE' PEACH TREES TREATED WITH TWO SURFACTANTS

Surfactant	Time of application	Rate (% by vol)	Flowers removed (%)	Fruit set (%)	Fruit handthinned per tree	Fruit weight after hand-thinning (g)
Control	—	0	15	53	784	14
TG6	Full bloom	2	26	31	256	17
		4	45	16	92	16
	Petal fall	2	76	21	76	16
		4	90	9	32	16
TG10	Full bloom	2	23	40	282	17
		4	22	22	140	17
	Petal fall	2	81	14	196	16
		4	90	8	154	17

Two surfactants (TG6 and TG10) were sprayed at 70% full bloom or at petal fall and compared to an unsprayed control. Surfactants were applied to drip at 2 and 4% by volume.

Both sprays clearly killed flowers, which could be detected two days after application. By one week after application, there was a clear trend towards increasing flowers killed at higher rates for both chemicals. Spraying at petal fall removed a greater number of flowers compared to full bloom; however, symptoms were not fully developed one week after the first spray. Fruit set decreased with increasing rates of both chemicals and the number of fruit handthinned corresponded with fruit set.

TG6 killed more flowers than TG10 as indicated by the number of fruit that had to be handthinned. Spraying during petal fall killed more flowers than spraying at 70% full bloom. Fruit weight at the time of handthinning was improved by chemical thinning. These two chemicals look very promising as peach blossom thinners.

Effects of the Rate of Nitrogen and Times of Pruning on Three Varieties of Peach in Central Alabama

Bryan Wilkins, Robert Ebel, Robert Boozer, and Jim Pitts

Peach trees require nitrogen fertilization to produce high quality peaches and shoots for the next season's crop. Excessive nitrogen fertilization results in excessive vegetative growth that requires expensive pruning and shades the interior portion of the tree, which lowers fruit quality and reduces flower bud formation. Current commercial fertilization practices range from 60 to 90 pounds of nitrogen per acre per year depending on soil type. This level of nitrogen often results in excessive vegetative growth since orchards vary considerably in nitrogen available in the soil. Furthermore, the nitrogen requirement for trees varies with timing and extent of pruning.

The objective of this study was to define a nitrogen fertilization and summer pruning regime that optimizes fruit quality and yield while minimizing pruning and nitrogen fertilization requirement. The orchard was planted in February of 1998 with three varieties that vary in harvest date including an early (Surecrop), mid (Contender) and late (Encore) maturing variety. Each variety was planted in a completely randomized design in a split plot. The main plot received 30, 60, and 90 pounds of nitrogen per acre per year and the split plot received the pruning treatments of (1) winter pruning only, (2) winter pruning plus pruning just after harvest, and (3) pruning immediately before fruit thinning, two weeks before harvest, and after harvest.

Data taken included weights of all prunings, trunk cross sectional area, yield, fruit color, firmness, soluble solids, and average fruit weight. All data were analyzed using the procedures of the statistical analysis system (SAS).

There were no significant differences in any of the parameters tested for 'Surecrop' in 2000 with respect to the amount of N applied (see table). There was a difference by pruning method for 'Surecrop' on yield, total fruit number, and fruit firmness. Trees that were pruned only one time had significantly higher yield due to more fruit than did trees that were pruned two or three times. Trees that were pruned three times had firmer fruit than did trees that were pruned one or two times.

There was a significant difference in pruning weights for 'Contender' . Trees that received 30 and 60 pounds of N per acre per year had higher pruning weights than did trees that received 90 pounds of N per acre per year. Trees that were pruned two times had higher pruning weight than did the other two pruning treatments. Trees that were pruned three times had higher yield due to more fruit than trees pruned one or two times. Fruit from trees that were pruned three times had more red blush than did fruit of the other two pruning methods.

There were no differences in the parameters tested in respect to the amount of N applied for 'Encore' (see table). However, there was a difference in pruning weights by method of pruning. Trees pruned one time had higher pruning weights than did the other two pruning methods. Trees pruned two and three times had higher yield due to more fruit per tree than did the one time a year pruning method. Fruit weight for trees that were pruned only one time were significantly higher than the weights for fruit from the other two pruning methods. Fruit from trees that were pruned three times had more red color than did trees that were pruned one time.

Nitrogen has had little affect to date in this study, but pruning has had a large affect on yield and fruit quality.

INFLUENCE OF NITROGEN RATE AND PRUNING METHOD ON PEACH (*PRUNUS PERSICA* (L.) BATSCH) PERFORMANCE IN 2000

	Trunk cross-sectional area (cm^2/year)	Pruning weight (kg/tree/year)	Yield (kg/tree)	Avg. fruit weight (g/fruit)	Total number of fruit/tree	Firmness (lbs)	Soluble solids (%)	Fruit color (%)
'Surecrop'								
Nitrogen rate (lbs/acre)								
30	69	8.6	11.3	122	94	8.6	11.7	75
60	77	10.8	11.9	120	102	9.2	11.3	72
90	64	8.3	10.8	120	91	8.6	11.7	74
Pruning (no. times/year)								
1	73	7.2	13.8 a	119	117 a	7.7 b	11.8	75
2	66	10.2	12.5 a	124	104 a	8.4 b	11.7	69
3	71	9.2	7.8 b	118	67 b	10.5 a	11.1	76
'Contender'								
Nitrogen rate (lbs/acre)								
30	78[x]	10.7a	15.7	92	174	9.1	14.2	75
60	70	10.1a	13.6	93	150	8.9	14.3	70
90	72	8.3b	15.2	88	159	8.3	14.5	74
Pruning (#times/year)								
1	72	8.7 b	8.9 b	87	112 b	8.6	14.3	65 c
2	72	12.4 a	14.1 b	90	158 b	8.5	14.5	71 b
3	75	8.2 b	21.3 a	97	212 a	9.1	14.3	85 a
'Encore' [1]								
Nitrogen rate (lbs/acre)								
30	73	8.5	19.5	135	146	7.1	15.3	56
60	77	8.9	20.4	147	139	6.3	15.2	60
90	67	8.3	16.0	138	114	7.5	15.4	57
Pruning (#times/year)								
1	70	10.2 a	13.5 b	150 a	88 b	6.7	15.1	52 b
2	75	8.5 b	20.9 a	142 b	144 a	6.4	15.4	59 ab
3	72	7.9 b	21.7 a	129 c	167 a	8.0	15.4	62 a

[1] Encore was not pruned after harvest due to drought and lack of growth in 2000.
Numbers within columns followed by the same letter are not significantly different (P=0.05, DMRT). Numbers in columns without letters were not significantly different.

EFFECT OF PRIMOCANE TOPPING HEIGHT AND LATERAL LENGTH ON YIELD OF 'NAVAHO' BLACKBERRY

David G. Himelrick, Robert Ebel, Floyd M. Woods, Bryan Wilkins, and Jim A. Pitts

'Navaho' erect thornless blackberry plants were subjected to a combination of three primocane summer topping heights and two lateral length pruning treatments. Plants were topped at 91, 122, and 152 cm (three, four, and five feet) tall, and laterals were shortened to either 30 or 61 cm (12 or 24 inches) in length. Treatment effects on yield and plant structure were examined for four growing seasons. Lateral length had little effect on yield and any pruning height. Yield generally increased with increasing plant height. The 122-cm height appeared to optimize yield while still allowing for manageable floricane architecture.

Established 'Navaho' blackberries growing at the Chilton Area Horticulture Station in Clanton, Alabama, were used in this study. Rows were spaced 3.7m (12 feet) apart and plots consisted of 3.7m (12 feet) of row separated by a 61 cm (two foot) space where plants were mowed. The following treatments were imposed on the planting. Primocanes were summer topped at heights of 91, 122, and 152 cm. Laterals were shortened to 30.5 or 61 cm. The six treatments were each replicated six times. Berries were picked every three to five days during the harvest season. The weight of 25 berries was also determined for each harvest date

for each plot. Plots were drip irrigated and weeds controlled with herbicides. Mowed sod middles were maintained between rows. Data were collected for five seasons (1992 to 1996).

Yield response for treatments varied with year (see figure). The average response over five years showed that, generally, lateral length (30.5 versus 61 cm) had little effect on yield. Although not statistically different, plants pruned at the 122 and 152 cm height tended to outperform those pruned at 91 cm. The 152 cm cane height has the potential for highest yields but may tend to obstruct row middles. The 122 and 152 cm pruning height produced laterals at a more convenient picking height than those summer topped at 91 cm.

Average berry weights are presented in the table. The weights varied with year and treatment but the long-term average showed a tendency for the longer lateral length to reduce berry size. The effect of summer topping height was variable and inconsistent on berry weight.

Gundersheim and Pritts (1991) found that yield was positively related, while fruit size and fruit count were negatively related to cane length in 'Royalty' purple raspberry. Shortening lateral branches resulted in more fruitful laterals at the proximal end of the branch, but weight per fruit did not change significantly. The average fruit count per lateral on shortened branches was greater because distal fruiting buds had fewer flowers.

Effect of Pruning Treatment on Average Berry Weight, 1992-1996

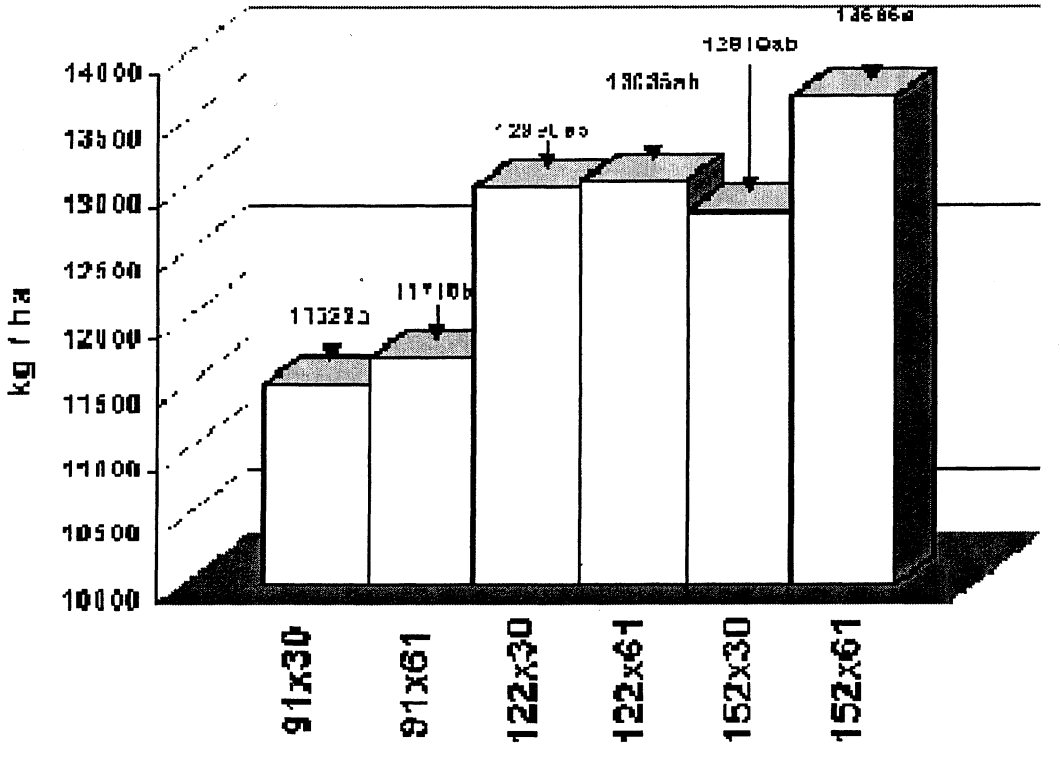
Treatment (cm)	Weight of 25 berries (g)
91 x 30.5	133 a
91 x 61	129 a
122 x 30.5	142 a
122 x 61	129 a
152 x 30.5	139 a
152 x 61	137 a

Numbers within columns followed by the same letter are not significantly different (P=0.05, DMRT).

Lipe and Martin (1983) point out that primocanes need be topped to induce lateral shoot growth and produce a more compact hedgerow with greater fruiting area. They suggest topping new canes at about 91 cm in the second and third year. To allow for higher yields the topping height is gradually raised to 122 to 152 cm in subsequent years.

Based on all horticultural and management implications we would suggest a pruning height of 122 cm and a lateral length of 30.5 cm for 'Navaho' blackberries.

Effect of pruning treatment on yield. Average of 1992-1996 harvest seasons.



THORNLESS BLACKBERRY PERFORMANCE ON THE GULF COAST

Monte Nesbitt, David Himelrick, Ron McDaniel, and Malcomb Pegues

Little has been published about blackberries on the Gulf Coast, yet there is great interest in them for dooryard plantings and commercial ventures. Blackberries are known to have problems with two diseases: double blossom rosette and orange rust. Both diseases are virtually uncontrollable when climate is favorable and the cultivar is susceptible.

A blackberry cultivar trial was planted in 1999 at the Gulf Coast Regional Research and Extension Center in Fairhope, Alabama, to study yield and quality traits. Thornless varieties in general have greater resistance to double blossom than thorny types, but greater susceptibility to orange rust. Thorny cultivars were omitted from the trial at Fairhope in an attempt to avoid problems with double blossom.

Six cultivars were planted, including 'Navaho', 'Arapaho', 'Apache', 'Loch Ness', 'Triple Crown', and 'Chester'. Plants were spaced 1.5 feet apart in 15 foot long plots, and there were five plots of each cultivar. The plots were separated by an eight-foot-wide alley, and rows were 20 feet apart. Plants were set out in March 1999, except for 'Apache', which was planted in September. Apache did not fruit in 2000, due to the later planting date. A two-wire trellis with wires at three feet and 5.5 feet was constructed for all plants. Each plant was fertilized once in 1999 and twice in 2000 with one quarter pound of 10-10-10 fertilizer. The planting was drip irrigated as needed.

Primocane growth was greatest in 1999 on 'Triple Crown' and 'Chester', which both have a trailing growth habit. These two cultivars also leafed out and bloomed sporadically in 2000 as if suffering from lack of chilling. Chill hour accumulation at Fairhope in the winter of 1999-00 was approximately 650 hours. 'Loch Ness', a semi-erect cultivar, was the least vigorous cultivar and had slight insufficient chilling. 'Arapaho' and 'Navaho' made vigorous growth and appeared to have sufficient chilling. Orange rust was discovered on one plant each of 'Arapaho' and 'Navaho' in 1999, and on one plant of 'Navaho' in 2000. Plants with rust were pulled to prevent further spread of disease.

The cultivar with the best-tasting fruit was 'Triple Crown', which peaked in mid July (see table). Yield of 'Triple Crown', however, was extremely low due to insufficient chilling. Berries on 'Triple Crown' were difficult to locate due to excessive primocane growth, and berries became overripe very quickly. 'Arapaho' was the earliest maturing cultivar and had good flavor and good yields. The other three cultivars produced berries that were very acidic (tart) and not very appealing. The yield of 'Arapaho', 'Navaho', and 'Loch Ness' were encouraging in 2000, but further study is needed to fully determine which, if any, are suited to the Gulf Coast.

CHARACTERISTICS OF BLACKBERRIES GROWN ON THE GULF COAST OF ALABAMA

Cultivar	Avg total yield/plant (lbs)	No. berries/lb	No. berries/pt	No. pts/plant	Harvest period	Taste (1-10)	Brix (max)
Arapaho	5.7	89	47	10.8	May 15 - June23	7	9.0
Navaho	4.6	94	45	9.6	May 15 - July 18	4	9.0
Loch Ness	3.6	80	45	6.4	June 9 - Aug 1	5	10.0
Chester	1.8	107	48	4.0	June 23 - Aug 18	4	8.6
Triple Crown	0.6	76	42	1.1	June 23 - July 28	8	12.0

Evaluation of TerraPy B for Increasing Production of Strawberries

Edward J. Sikora and Jim A. Pitts

TerraPy B is an organic product that has been shown to reduce plant stress by stimulating soil microbiological activity and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if TerraPy B would increase yield of strawberries when applied as a soil drench at transplanting. Results indicate that low concentrations of TerraPy B increase yields whereas high concentrations appeared to be phytotoxic and yield reducing.

The experiment was conducted at the Chilton Area Horticultural Station in Clanton, Alabama. The strawberry variety 'Chandler' was treated and transplanted into the field on October 1, 1999. Plants were grown on raised beds with black plastic mulch and drip irrigation. Treatments were applied by hand-dipping the bottom half of strawberry plugs into one of the six solutions (treatments). The six treatments consisted of TerraPy B at concentrations of 0, 5, 10, 20, 40, or 80%. Excess solution was allowed to drain-off roots before they were planted into the field. All plots were treated with standard disease and insect control practices during the season.

A plant health rating (1 to 5 scale) was taken on November 2, 1999. A plant stand count (total number of living plants) was taken on May 25, 2000. Harvest began on March 28 and ended on May 18, 2000; fruit was picked weekly during this period. Total weight of marketable fruit was determined.

Plants treated with TerraPy B 5% had a significantly higher plant health rating along with the untreated control compared to the other four treatments (see table). Plants treated with TerraPy B 10% had a significantly higher plant health rating than those treated with TerraPy B 40%. Plants treated with TerraPy B 80% had a significantly lower plant health rating than all other treatments. Plants treated with TerraPy B 80% were of very poor health one month after treatment indicating that the product may be phytotoxic to strawberries at this concentration. TerraPy B 80% also had a significantly lower stand count among all the treatments, which would also indicate that the product was toxic to plants at this high concentration.

Evaluation of TerraPy B for Increasing Production of Strawberries, Clanton, 2000

Treatment (concentration)	Plant health [1]	Plant stand	Yield (kg)
Control	4.0 a	12.6 a	4804.4 ab
Terra Py B 5%	4.0 a	13.3 a	5509.0 a
Terra Py B 10%	3.0 b	14.0 a	5408.1 a
Terra Py B 20%	2.6 bc	12.6 a	4110.8 ab
Terra Py B 40%	2.3 c	12.0 a	3710.3 b
Terra Py B 80%	1.0 d	6.3 b	1538.1 c

[1] Plant health was based on a 1-5 rating with 1 = poor growth and 5 = excellent growth.

TerraPy B 5% and 10% produced the greatest yield, though not statistically different than the untreated control and TerraPy B 20%. Both TerraPy B 5% and 10% yielded significantly better then both TerraPy B 40% and 80%. All treatments yielded significantly better than TerraPy B 80%.

Evaluation of Floating Row Covers on Strawberries

David G. Himelrick, Jim A. Pitts, Robert Boozer, Bryan Wilkins, and Robert Ebel

The response of strawberry plants in the annual hill plasticulture system to the use of lightweight nonwoven rowcovers during the fall establish period, winter, and early spring was investigated. Floating row covers commonly range in weight from 0.5 to 1.8 ounces per square yard; they provide some cold and wind dessication protection and also increase soil and air temperatures around the plant. Very light weight (0.5 oz.) fabric was used. The fabric transmitted about 85% of the available light and gave plants some freeze protection down to 28° F. The increased temperatures under the cover may stimulate increased flower bud formation during the short day induction cycles in the fall and spring. Additionally, the covers may provide a protective environment where leaves remain functional for longer periods and crown and root development may be stimulated.

In this study row covers were installed and removed at various intervals from October through March. In addition to the uncovered control plants the following row cover timings were imposed: Oct.-Mar., Oct.-Feb., Oct.-Dec., Oct.-Nov., Nov.-Mar., Oct.-Feb., Oct.-Jan., Oct.-Dec., Oct.-Nov., Nov.-Mar., Dec.-Mar., Jan.-Mar., and Feb.-Mar.

Row cover material was 0.5 ounce per square yard (Atmore Industries, Atmore, Alabama) and was secured from the edge of the beds and allowed to loosely cover each plot.

Freshly dug 'Chandler' plants from Canadian nurseries were planted during the second week of October in 1996, 1997, 1998, and 1999 at the Auburn University Chilton Area Horticulture Station in Clanton, Alabama. The soil type is a ruston sandy loam. The plot was plowed and tilled, and 50 pounds per acre of

N, $P_2 0_5$, and $K_2 O$ was broadcast prior to bed shaping. Raised bed dimensions were 30 inches across the top and eight inches high with beds spaced five feet on center. Beds were fumigated with 240 pounds per acre 98/2 methybromide/choropicrin. Beds were covered with black plastic mulch and trickle irrigated along with receiving a supplemental application of five to seven pounds per acre of nitrogen per week through the irrigation system. Pesticides were applied as needed. Each plot consisted of 14 plants using a double row with 12 inches between plants and 14 inches between rows. Each treatment was replicated six times. Marketable yield and weight per berry from a 25 berry sample was taken at each harvest date.

The weight of marketable berries was affected by year and by treatment. Average performance of the four-year period showed the Oct.-Feb. treatment to have the highest yields followed by Oct.-Nov. and Feb.-Mar. The Jan.-Mar. treatment performed worse than the control in terms of both yield and berry size. Average berry weight was improved in the Oct.-Feb. and Oct.-Nov. treatment. Row covers in the best treatment (Oct.-Feb.) improved marketable yield by an average of 35% over the control.

Economic considerations would indicate that row covers can significantly increase profitability. The current cost of 0.5 ounce material is about $420.00 per acre F.O.B. Atmore, Alabama. Assuming a retail price of $1.00 per pound for strawberries, it would take only an additional 500 pounds of fruit per acre to justify the cost of the material. With the potential to increase marketable yields of 35% it would take just a fraction of the increased production to pay for the cost and installation of the row cover material.

EVALUATION OF FUNGICIDE SPRAY PROGRAMS FOR PECAN SCAB CONTROL

Edward Sikora and Jason Burkett

Pecan scab, a fungal disease of pecan, is one of the most limiting factors to pecan production in the Southeast. To control this disease, growers must maintain a calendar-based spray program from budbreak through mid August. In 2000, several new fungicide products (AgriTin, Enable/AgriTin copack, Sovran) and some experimental compounds (Folicur, Eminent) were evaluated for scab control. Results showed that all the fungicide treatments were significantly better than the unsprayed control in controlling nut scab.

The experiment was conducted at the E. V. Smith Research Center in Shorter, Alabama. All of the fungicide treatments (spray programs) were initiated within 10 days after budbreak and followed a 14-day schedule throughout the season. Leaf scab was assessed on June 30 and nut scab was rated on September 12.

The weather conditions were not favorable for leaf scab development. Normally leaf scab ratings are taken in early June but ratings were taken later in the month during 2000 due to the dry conditions. Leaf scab incidence was still relatively low even at this later date. All the fungicide treatments were significantly better than the unsprayed control in controlling leaf scab with the exception of the full season Super Tin program (see table).

All the fungicide programs controlled nut scab significantly better then the unsprayed control. The Orbit/Super Tin copack, the Enable/Agritin copack, and the Eminent/Sovran tank mix had the lowest level of nut scab, though there were no significant differences among the fungicide treatments.

EVALUATION OF FUNGICIDE SPRAY PROGRAMS FOR PECAN SCAB CONTROL, 2000

Treatment	Rate/ acre	Application timing[1]	% Leaf scab	% Nut scab
Unsprayed control	——	——	2.7 ab	54.2 a
Super Tin 80 WP	7.5 oz	Sprays 1-8	1.3 bcd	13.7 b
Folicur 3.6F + Induce	4 oz 0.06%	Sprays 1-3		
THEN Super Tin 80 WP	7.5 oz	Sprays 4-8	1.0 cd	16.4 b
Eminent 125SL	1 pint	Sprays 1-3		
THEN Super Tin 80 WP	7.5 oz	Sprays 4-8	1.0 cd	25.3 b
Eminent 125SL	1 pint	Sprays 1-3		
THEN Sovran 50WG	2.4 oz	Sprays 4-8	1.1 cd	19.2 b
Eminent 125SL + Sovran 50WG	1 pint 2.4 oz	Sprays 1-8	0.1 d	9.4 b
Orbit/SuperTin Copack (Orbit .25 lb + Super Tin 5.0 oz)		Sprays 1-8	0.4 d	5.0 b
Enable 75WP + Agritin 80WP	1.3 oz 3.8 oz	Sprays 1-8	0.8 d	5.3 b

[1] Total of eight sprays.
Numbers followed by the same letter are not significantly different.

Mechanical Thinning of Pecans Provides Financial Benefits

Monte Nesbitt, Bill Goff, Ron McDaniel, and Malcomb Pegues

Crop thinning has been proven to have two effects on pecan trees: improving kernel grade and reducing the severity of biennial or alternate bearing (nut crops every other year). The practice of reducing crop load with mechanical trunk shakers was introduced in the state of Alabama in 1993 through a study of differential levels of thinning on several pecan cultivars at the Gulf Coast Regional Research and Extension Center in Fairhope, Alabama. Results from the Fairhope experiment showed that pecan cultivars respond differently to thinning.

Some pecan cultivars, like 'Cape Fear', produce poorly developed kernels when the crop is big, and shaking some nuts off the tree in late July will improve the overall kernel percentage and the dollar value of the crop. If the dollar value improvement is great enough to compensate for the nuts that were shaken off, the grower makes more money the first year by thinning. If more nuts are produced the following year than would have been without thinning, the practice pays dividends twice. Other cultivars, like 'Stuart', maintain good quality with big crops; thus, thinning can reduce profits the first year, and the grower only comes out ahead financially, if the improvement in yield the second year compensates for the money lost the first year.

The wholesale pecan market is quite volatile from year to year, due in part to the alternate bearing of pecans. When the pecan crop is large regionally or nationally, prices are depressed. The converse is true in light production years. Crop thinning can help growers can come out ahead financially if they are able to shift their heaviest production to the light years and be off-cycle with the national crop. In that scenario, higher prices in the second year more easily offset the reduction in yield the first year. Growers who direct market their crop and have more price stability benefit from thinning by having trees that are more regular bearers from year to year.

'Pawnee' is a commercial cultivar that is known to alternate bear badly; however, it tends to make good quality kernels in big crop years and demands a premium price because it is very early maturing. The effects of mechanical thinning on 'Pawnee' have not been previously tested. One-half of a uniform group of 18-year-old 'Pawnee' trees were shaken in late July 1999, to remove 30 to 40% of the crop. The other half were not shaken. Yields were collected from each tree and nut samples were analyzed to determine quality improvement. Thinning had no effect on kernel percentage in 1999, which meant that dollar value per acre was reduced that year (see table). In 2000, trees that were thinned yielded 33 more pounds of nuts per tree and dollar value for both years combined was in favor of thinning.

Result of Thinning on 'Pawnee' Pecan Trees

Pawnee treatment	Yield 1999 (lbs/tree)	% kernel	$/ac 1999 [1]	Yield 2000	Total $/ac[2] 1999-00
Thinned	47.2	57.1	$826.00	42.17	$1563.98
Not thinned	70.9	57.4	$1240.75	9.40	$1405.25

[1] at 14 trees per acre and $1.25/lb [2] at $1.25/lb

Effects of Storage Conditions on Postharvest Quality of Satsumas

Monte Nesbitt, Robert Ebel, Ron McDaniel, and Malcomb Pegues

Satsuma oranges have a reputation for not storing well after harvest. Producers of satsumas in South Alabama at the present time generally do not use cold storage, and fruit is often held in ambient temperature and humidity facilities for variable periods prior to sale. Individuals often purchase satsumas in bushel or half-bushel quantities, and after purchase will continue to hold fruit inside at room temperature or on a porch outside their home for several days. A study was done in 1999 at the Gulf Coast Regional Research and Extension Center in Fairhope, Alabama, to measure quality changes in satsuma oranges after harvest, as affected by storage environment.

A bulk quantity of fruit was harvested from four, 10-year-old 'Owari' satsuma trees on two dates, October 26 and November 16, 1999, which represented the early harvest period and peak harvest period, respectively. Half of the fruit was stored in a waxed, cardboard vegetable box (1.1-bushel size), and placed in a walk-in refrigerator operating at a constant, 40° F temperature. The other half of the fruit was stored in a carboard box inside a metal barn with no heating or cooling. During the day the barn doors were open, and at night the doors were closed. Three days after harvest, twelve fruit were sampled from each storage treatment and compared to twelve fruit picked directly from the same

four data trees. Peel color and taste were measured on a subjective scale. Brix was measured with a refractometer and titratable acidity was measured according to accepted laboratory procedures. Fruit from the first harvest was measured every three to four days for 21 days. Fruit from the second harvest was measured every seven to 11 days for 31 days.

Peel color development was retarded in both storage treatments compared to fruit fresh from the tree. Fruit stored at 40°F was still quite green 21 days after harvest. Likewise after the second harvest, fruit peel did not fully turn orange in either storage treatment. Commercial satsuma growers should not expect much color improvement after fruit is harvested, unless ethylene gas treatment or other color enhancement technique is employed. Peel dehydration was a problem for fruit stored in the barn, and was quite noticeable ten days after harvest. At 17 days postharvest, the peel was so dehydrated, that the fruit could not be peeled by hand.

Refrigeration gave a slight improvement in taste three and six days after the first harvest. Beyond that, there was very little difference in taste among the three treatments. Brix measurements were not much different among treatments, except that refrigerated storage limited brix increase in fruit picked in the first harvest. By December 17, brix was near 11% in fruit on the tree, but neither storage treatment exceeded 10% by termination of the study. Sugar accumulation of 'Owari' did not peak until mid to late December in either 1998 or 1999. Titratable acidity was not clearly better for any storage treatment, and when the brix-to-acid ratio was computed, the earliest date that fruit would meet a 10:1 brix:acid ratio to be legal for sale in Louisiana was November 19. In 1998, a 10:1 ratio was achieved by November 9. The taste ratings from this study reflect that the fruit began to taste "very sweet" on November 30.

While there are other quality problems that begin to appear as fruit harvest is prolonged, like freeze injury, softening, and rind puffing, the sweetest satsumas grown in Alabama are those that stay on the tree until mid December. If freezing of the fruit is not a danger, fruit should be held on the tree until ready to be marketed. If a bulk quantity of fruit must be harvested and held for several days, they should be refrigerated to prevent desiccation of the rind. If refrigeration is not available, fruit should be stored outside to take advantage of cool nighttime temperatures that will limit desiccation.

VEGETABLE PAPERS

Evaluation of TerraPy B for Control of Root-knot Nematodes on Cucumber

Edward Sikora and Arnold Caylor

TerraPy B is an organic product that has been shown to reduce plant stress and plant disease activity by stimulating soil microbiological activity and promoting nutrient uptake of various horticultural and agronomic crops in Europe. The objective of this study was to determine if the product would reduce root-knot nematode damage and/or increase yield or fruit quality of cucumber. Results indicate that TerraPy B did not reduce damage from root-knot nematode nor did it increase yield or fruit quality of the crop.

This test was conducted in 1999 at the North Alabama Research Station in Cullman, Alabama. The cucumber 'General Lee' was transplanted into raised beds covered with white plastic mulch in a root-knot nematode infested field in May. Treatments were applied at-planting or as a foliar spray during the season. Soil samples were taken at-planting and at harvest and analyzed for nematodes, and the root system of five plants per plot were rated for root-knot nematode galling. Cucumbers were harvested over a three-week period and total yield in number and weight were determined. Fruit were also graded.

There were no significant differences in root-knot nematode root damage among the treatments (Table 1). There were no significant differences in total yield in terms of number or weight of fruit (data not shown). There were also no significant differences in number or weight of fruit at any of the three size groups (Table 2). No significant differences on the growth of plants among the various treatments were observed.

Due to some confusion prior to the test, we used a very low rate of TerraPy B in this experiment. The lack of any significant results may have been due to this fact.

Table 1. Effect of TerraPy B on Root-knot Nematode Damage on Cucumber, North Alabama Research Station, Cullman, 1999

Treatments/rate[1]	Application method	RKN root damage rating[2]
Vydate L (1.9 L/acre)	Applied as a foliar spray 2 and 4 weeks after transplanting	42.6 a
Urea (4 g/m^2)	Applied at planting	23.0 a
TerraPy B (20 g/m^2)	Applied at planting	20.0 a
TerraPy B (20 g/m^2) + Vydate L (0.473 L/acre)	Applied at planting Applied as a foliar spray 2 and 4 weeks after transplanting	33.6 a
TerraPy B (10 g/m^2) + Vydate L (0.95 L/acre)	Applied at planting Applied as a foliar spray 2 and 4 weeks after transplanting	21.8 a

[1] A one liter solution of each product was made; 50 ml of the solution was poured into the transplant hole for each plant (13 plants/replication) on the day of transplanting.
[2] % of roots with RKN galls at final harvest.

Table 2. Effect of TerraPy B on Cucumber Yield by Fruit Grade, North Alabama Research Station, Cullman, 1999

Treatments/rate	Yield (lb/plot)			
	Fancy[1]	No. 1	No. 2	Total
Vydate L (1.9 L/acre)	35.9 a	13.6 a	8.4 a	57.9 a
Urea (4 g/m^2)	39.2 a	16.3 a	10.3 a	65.9 a
TerraPy B (20 g/m^2)	40.7 a	13.8 a	10.4 a	64.9 a
TerraPy B (20 g/m^2) + Vydate L (0.473 L/acre)	39.3 a	12.1 a	9.5 a	61.1 a
TerraPy B (10 g/m^2) + Vydate L (0.95 L/acre)	41.1 a	13.2 a	10.0 a	64.4 a

[1] Fancy = the largest fruit; No. 2 = the smallest. Fruit were harvest over a three-week period. Numbers followed by the same letter are not significantly different.

EVALUATION OF TERRAPY B FOR INCREASING YIELDS OF CUCUMBER

Edward Sikora and Arnold Caylor

TerraPy B is an organic product that has been shown to reduce plant stress and plant disease activity by stimulating soil microbiological activity and promoting nutrient uptake in various horticultural and agronomic crops in Europe. The objective of this study was to determine if the product would reduce root-knot nematode damage and/or increase yield of cucumber. Results indicate that TerraPy B did not reduce damage from root-knot nematode but may increase yield potential of cucumber.

TABLE 1. THE EFFECT OF TERRAPY B ON YIELD OF CUCUMBER, CULLMAN, ALABAMA, 2000

Treatments / rate (g/ml/water)[1]	–Number of fruit by size– Fancy[2]	No. 1	No. 2	Total number of fruit
Control (urea) (4 g/m^2)	62.1 a	54.8 ab	45.0 a	162.0 ab
Methyl bromide	73.6 a	53.3 ab	45.3 a	172.3 a
TerraPy B (20 g/m^2)	60.1 a	46.0 ab	37.6 a	143.8 b
TerraPy B (10 g/m^2)	65.3 a	45.0 b	43.0 a	153.3 ab
TerraPy B (2 g/m^2)	67.5 a	57.3 a	47.3 a	172.1 a
TerraPy B (10 g/m^2) [3]	63.1 a	47.1 ab	42.3 a	152.6 ab
LSD (P = 0.05)	14.4	11.7	10.3	27.3

[1] TerraPy B treatments were applied in 250 ml of water as a soil drench at the time of transplanting.
[2] Fancy = the largest size fruit; No. 2 = the smallest sized fruit still considered marketable.
[3] Treatment was applied in 250 ml of water as a soil drench at transplanting and four weeks after transplanting.
Numbers followed by the same letter are not significantly different.

TABLE 2. THE EFFECT OF TERRAPY B ON ROOT-KNOT NEMATODE IN CUCUMBER, CULLMAN, ALABAMA, 2000

Treatments / rate (g/ml/water)	Root-knot damage rating	Final root-knot population
Control (urea) (4 g/m^2)	0.1 a	11.0 a
Methyl bromide	0.1 a	2.6 a
TerraPy B (20 g/m^2)	0.6 a	8.6 a
TerraPy B (10 g/m^2)	0.5 a	8.6 a
TerraPy B (2 g/m^2)	0.6 a	36.3 a
TerraPy B (10 g/m^2) [1]	0.4 a	16.0 a

[1] Treatment was applied in 250 ml of water as a soil drench at transplanting and four weeks after transplanting.
Numbers followed by the same letter are not significantly different.

The test was conducted in 2000 at the North Alabama Research Station in Cullman, Alabama. The cucumber 'General Lee' was transplanted into raised beds covered with white plastic mulch in a root-knot nematode infested field on May 16. Treatments other than the methyl bromide standard were applied as a soil drench on the day of transplanting. A second application of TerraPy B at 10 grams per square meter was applied as a soil drench in one treatment on June 13 (Table 1). Soil samples were taken after harvest and analyzed for nematodes. Five plants from each plot were excavated after harvest and their root system was rated for root-knot nematode damage on a 1-10 scale (Table 2) Cucumbers were harvested weekly for four weeks and graded; total number of fruit was also determined.

The root-knot nematode population was relatively low and widely dispersed in the field; consequently, TerraPy B's ability to control root-knot nematode on cucumber could not be adequately tested. There were no significant differences in terms of the root-knot nematode damage rating or in the root-knot nematode population at harvest (data not shown). However, since the nematode population was uniformly low throughout the plot, information on TerraPy B's effectiveness as a growth enhancer was obtained.

The only significant differences were between TerraPy B at two grams per square meter and TerraPy B at 10 grams per square meter in both total number of fruit produced and total number of No. 2 sized fruit produced (Table 1). There were no significant differences among the other treatments.

TerraPy B at two grams per square meter produced the same number of fruit as the methyl bromide treatment and approximately 6% more fruit than the untreated control. TerraPy B at two grams per square meter appeared to increase yields slightly more than TerraPy B at 10 grams per square meter, which increased yields slightly more than TerraPy B at 20 grams per square meter. It may be that a low rate of TerraPy B will give a slight yield increase, but as the rate increases, the product becomes phytotoxic, which reduces yields.

Evaluation of Powdery Mildew Tolerant Pumpkin Varieties and Fungicides Spray Schedules for Controlling Powdery Mildew

Edward Sikora, Joseph Kemble, Arnold Caylor, and Derenda Hagemore

Powdery mildew is a common fungal disease of pumpkin in Alabama. The disease reduces yields by decreasing the size or number of fruit or the length of time crops can be harvested. This disease is easily recognizable by the talcum-powder like fungal growth that develops on both the upper and lower leaf surface.

Controlling powdery mildew typically requires applying fungicides on a weekly basis throughout the season. Though this practice is often effective, it can also be costly to the producer due to the expense of the fungicide materials. Recently, pumpkin varieties were released that have been marketed as being tolerant to powdery mildew. Tolerance means that plants can be attacked by the fungus, but symptoms may not be as severe and yields will not be reduced.

In 2000, powdery mildew-tolerant varieties were evaluated under different fungicide spray schedules at the North Alabama Research Station in Cullman, Alabama. Results showed that growing a powdery mildew-tolerant variety while following a seven-day spray schedule will significantly reduce the severity of powdery mildew and increase yield. Results also indicated that a tolerant variety produced while following a 10- to12-day spray schedule will yield as well as a susceptible variety sprayed every seven days. This is significant in that a grower would save money by reducing the number of fungicide application required to produce a crop.

The pumpkins 'Magic Lantern' and 'Merlin', both tolerant to powdery mildew, and the powdery mildew-susceptible 'Appalachian' were direct seeded on June 20. Varieties were sprayed on either a seven-day or a 10- to12-day schedule, or they were left unsprayed. The fungicide spray program consisted of Abound alternated with Bravo Ultrex. Application begun at vine run. Severity of powdery mildew was rated on August 28 and September 14, and the crop was harvested in late September.

The powdery mildew-tolerant varieties performed well in this test. Following a seven-day spray schedule, 'Magic Lantern' and 'Merlin' had significantly less powdery mildew and produced the highest yields (see table). Both varieties, when sprayed every 10 to 12 days, produced as well as 'Appalachian' sprayed on a seven-day spray schedule. In terms of yield, 'Merlin' and 'Magic Lantern' performed better than 'Appalachian' when compared on a seven-day or a 10- to 12-day spray schedule, or when left unsprayed.

This test will be repeated in 2001 so that these new varieties can be further evaluated under the various spray programs.

Evaluation of Powdery Mildew-Tolerant Pumpkin Varieties and Fungicides Spray Schedules for Controlling Powdery Mildew, Cullman, Alabama, 2000

Variety/fungicide schedule[1]	—% Powdery mildew— Aug. 28	Sept. 14	—Fruit— Number	Weight[2]
Appalachian/unsprayed	29.5 a	60.3 a	5.5 d	46.0 e
Appalachian /7 days	17.0 b	54.2 a	11.5 bc	121.7 bc
Appalachian/10-12 days	29.2 a	67.1 a	8.5 cd	88.4 cd
Magic Lantern/unsprayed	15.5 b	53.6 a	9.5 cd	80.1 de
Magic Lantern /7 days	1.0 c	14.0 d	17.0 a	172.1 a
Magic Lantern/10-12 days	1.7 c	34.0 bc	11.0 bc	113.7 bcd
Merlin/unsprayed	15.0 b	51.2 ab	11.5 bc	96.8 bcd
Merlin/7 days	0.7 c	17.7 cd	15.2 ab	130.6 b
Merlin/10-12 days	2.5 c	59.3 a	11.5 bc	104.1 bcd

[1] Treatments were sprayed on 7 or 10-12 day intervals. The fungicide program for all treatments, with the exception of the unsprayed control, was Abound alternated with Bravo Ultrex initiated at vine run.
[2] Weight was measured as pounds per plot.

EVALUATION OF INTEGRATED PEST MANAGMENT PRACTICES FOR CONTROLLING POWDERY MILDEW ON PUMPKIN

Edward Sikora, Joseph Kemble, Arnold Caylor, and Derenda Hagemore

Powdery mildew is a common fungal disease of pumpkin in Alabama. This disease reduces yields by decreasing the size or number of fruit or the length of time crops can be harvested. The disease is easily recognizable by the talcum-powder like fungal growth that develops on both the upper and lower leaf surface.

Controlling powdery mildew typically requires applying fungicides on a weekly basis throughout the season. Although this practice is often effective, it can also be costly to the producer due to the expense of the fungicide materials. Recently, pumpkin varieties were released that have been marketed as being tolerant to powdery mildew. Tolerance means the plants can be attacked by the fungus, but symptoms may not be as severe and yields will not be reduced.

In 2000, a powdery mildew-tolerant pumpkin variety was evaluated with two Integrated Pest Management (IPM) strategies at the North Alabama Research Station in Cullman, Alabama. The two IPM strategies were as follows. First, the fungicide spray program was initiated if and when the disease was first observed in the field by way of a scouting program (fields were scouted twice a week beginning at plant emergence). Second, the period between fungicide applications on the powdery mildew-tolerant pumpkin varieties was extended from seven days to 10 to12 days. Results indicate that when growing a tolerant variety, the number of fungicide applications can be reduced by starting a spray program only after powdery mildew is observed in the field through scouting. It also appeared that when using a tolerant variety, the time between application can be extended to 10 to 12 days.

The pumpkin 'Magic Lantern' was direct seeded into all plots on June 20. The experiment compared four fungicide programs and an unsprayed control for their effectiveness in controlling powdery mildew. The four fungicide programs consisted of Abound alternated with Bravo Ultrex on a seven-day or a 10- to 12-day schedule with programs initiated at vine run or when the disease was first observed in the field. Severity of powdery mildew was rated on September 12 and October 6.

EFFECTIVENESS OF VARIOUS IPM PROGRAMS ON POWDERY MILDEW DEVELOPMENT ON A POWDERY MILDEW-TOLERANT PUMPKIN VARIETY, CULLMAN, ALABAMA, 2000

Fungicide timing/ when initiated [1]	—% Powdery mildew— Sept. 2	Oct. 6
7 days/vine run	1.0	67.6
10-12 days/vine run	1.4	68.8
7 days/scouting	0.2	48.0
10-12 days/scouting	0.4	59.8
Unsprayed control	11.6	75.4

[1] Treatments were sprayed on seven-day or 10- to 12-day intervals. Treatments were initiated at vine run or at first appearance of disease when following a biweekly scouting program. The fungicide program for all treatments, with the exception of the unsprayed control, was Abound alternated with Bravo Ultrex.

The programs that incorporated scouting had the least amount of powdery mildew at harvest (see table). Powdery mildew severity was about 12% less in the seven-day spray schedule/scouting program versus the 10- to12-day spray schedule/scouting program. The 10- to12-day spray schedule/scouting program utilized four fewer fungicide applications than the commercial standard (seven-day spray schedule initiated at vine run), which would saved the grower about $100 per acre in fungicide costs.

Extremely dry weather and a lack of irrigation water greatly affected yields in this study. This test will be repeated in 2001 so that the viability of these IPM programs can be better determined.

Evaluation of Serenade for Control of Powdery Mildew on Pumpkin

Edward Sikora, Arnold Caylor, and Derenda Hagemore

Serenade Biofungicide, a *Bacillus subtilis* discovered and commercially introduced by AgraQuest, Inc., is active against a wide array of important plant pathogens. The objective of this study was to determine the effectiveness of Serenade against powdery mildew on pumpkins. A full season Serenade program was compared to various other commonly used spray programs. Results showed that a full season sulfur program, or a program consisting of Abound alternated weekly with Bravo Ultrex, controlled powdery mildew better than a full season Serenade program, or a program in which Serenade was alternated weekly with Bravo Ultrex.

In 2000, the experiment was conducted at the North Alabama Research Station in Cullman, Alabama. The pumpkin 'Appalachian' was direct seeded into plots on June 20. The experiment compared six fungicide spray programs (treatments) for their effectiveness in controlling powdery mildew. Severity of powdery mildew was rated on September 2 and September 12. Powdery mildew was the only disease observed in the experiment.

Serenade at four pounds per acre,applied for the full season, had the highest level of powdery mildew on both rating dates (see table). The sulfur, Abound alternated with Bravo Ultrex, and Nova alternated with Bravo Ultrex programs all had significantly less powdery mildew than Serenade at the four pound rate on both dates. The Serenade alternated with Bravo Ultrex treatment performed slightly better than the full season Serenade program, though differences were not significant statistically. The sulfur and Abound alternated with Bravo Ultrex treatments had significant less powdery mildew than the Serenade alternated with Bravo Ultrex program.

Evaluation of Fungicide Spray Programs for Control of Powdery Mildew, Cullman, Alabama, 2000

Treatment/ rate/acre [1]	—% Powdery mildew— Sept. 2	Sept. 12	Treatment/ rate/acre [1]	—% Powdery mildew— Sept. 2	Sept. 12
Sulfur 10 lb	13.0 bc	16.0 c	Nova 40 W 5 oz **Alternated with** Bravo Ultrex 2.7 lb	11.5 bc	26.6 bc
Abound 11 oz **Alternated with** Bravo Ultrex 2.7 lb	6.5 c	17.0 c	Serenade 4 lb **Alternated with** Bravo Ultrex 2.7 lb	25.5 ab	46.1 ab
Topsin M 70 WP 0.5 lb + Bravo Ultrex 2.7 lb **Alternated with** Bravo Ultrex 2.7 lb	16.0 abc	47.3 ab	Serenade 4 lb	31.5 a	58.1 a

[1] Spray programs were initiated when the vines began to run. Fungicides were applied every seven days full season or alternated weekly, depending on the treatment.

Numbers followed by the same letter are not significantly different.

EVALUATION OF SUMMER SQUASH VARIETIES WITH RESISTANCE TO MULTIPLE VIRUSES COMMON IN ALABAMA

Edward Sikora, John F. Murphy, Jason Burkett, and Tony Dawkins

Recently, Asgrow released two yellow crookneck squash varieties with resistance to three of the most common cucurbit viruses in Alabama. 'Liberator III' and 'Destiny III' are marketed as resistant to cucumber mosaic virus (CMV), watermelon mosaic virus (WMV), and zucchini yellow mosaic virus (ZYMV). These viruses are common problems in Alabama and cause a significant amount of yield suppression and a decrease in overall marketability of fruits. This study was initiated to determine how well these varieties perform in Alabama and how well their resistance will hold up to the virus strains found within the State. Results showed that virus incidence was 20 to 30% lower in 'Liberator III' and 'Destiny III' compared to virus-susceptible control varieties. The increased yield of marketable fruit and the reduction in the number of plants exhibiting virus-like symptoms may have been due to their resistance to WMV.

In 1999, this study was conducted at the E. V. Smith Research Center (EVSRC) in Shorter, Alabama, and at the Sand Mountain Research Station (SMREC) in Crossville, Alabama. The virus-resistant varieties 'Destiny III' and 'Liberator III' and two susceptible control varieties ('Lemon Drop' and 'Dixie') were direct seeded in early July at each site. Experimental plots were maintained during the season according to established commercial practices for the area. Plants were evaluated during the season for the presence of virus symptoms. At harvest, the number of marketable fruit and the marketable fruit weight were determined. Also at harvest, plants at each site were tested for the presence of CMV, WMV, ZYMV, and Papaya Ringspot Virus (PRSV).

At SMREC, virus symptoms were not observed in the virus-susceptible squash varieties, indicating that there was little to no virus disease pressure at this location. Yield data were taken to determine the potential of the four squash varieties in the absence of virus pressure (Table 1). Results indicate that there were no significant differences in the number of marketable squash fruit produced among the four varieties; however, production by 'Dixie' was approximately one-third of the other three varieties. There was a significant difference in marketable fruit weight between the 'Lemon Drop' and 'Dixie'. The low yields produced by 'Dixie' may have been caused by a poor plant stand, resulting from low germination of seed after planting. There were no differences in production of marketable fruit (number or weight) among the varieties 'Liberator III', 'Destiny III', or 'Lemon Drop', indicating that the virus-resistant varieties produced as well as the virus-susceptible variety ('Lemon Drop') in the absence of virus diseases.

Heavy virus disease pressure was observed at the EVSRC. PRSV and WMV appeared to be the most prevalent viruses present based on analysis of plants showing virus-like symptoms. WMV and PRSV were detected in 100 and 97.5% of the plants tested, respectively. ZYMV was detected in 17.5% of the plants tested. CMV was not detected at this location.

TABLE 1. YIELD DATA, SUMMER SQUASH TRIAL, SAND MOUNTAIN RESEARCH AND EXTENSION CENTER, CROSSVILLE, ALABAMA, 1999

Variety	Marketable fruit number	Marketable fruit weight (g/plot)
Liberator III	38.2 a	7,280 ab
Destiny III	49.2 a	7,583 ab
Lemon Drop	46.5 a	9,401 a
Dixie	15.7 a	2,596 b

Numbers followed by the same letter are not significantly different.

TABLE 2. YIELD DATA, SUMMER SQUASH TRIAL, E. V. SMITH RESEARCH CENTER, SHORTER, ALABAMA, 1999

Variety	Marketable fruit weight (g/plot)	Unmarketable fruit weight (g/plot)	Total fruit weight (g/plot)
Liberator III	2,640 b	4,738 a	7,378 a
Destiny III	3,856 a	4,706 a	8,562 a
Lemon Drop	1,428 c	7,796 a	9,224 a
Dixie	1,710 bc	5,610 a	7,320 a

Numbers followed by the same letter are not significantly different.

TABLE 3. VIRUS INCIDENCE, SUMMER SQUASH TRIAL, E. V. SMITH RESEARCH CENTER, SHORTER, ALABAMA, 1999

Variety	Total plants rated	% of plants exhibiting virus-like symptoms
Liberator III	48	54.1
Destiny III	47	44.6
Lemon Drop	48	77.0
Dixie	47	74.4

There were no significant differences in the total fruit weight among the squash varieties (Table 2). 'Destiny III' and 'Liberator III' produced significantly higher marketable fruit weight than 'Lemon Drop', and produced about one-third to one-half more marketable fruit in weight than 'Dixie'. ' Lemon Drop' had the smallest marketable fruit weight even though it produced the highest total fruit weight. This was due to its production of a large number of fruit considered unmarketable because they were off-color (green streaks) or distorted, apparently due to infection by PRSV and/or WMV.

Virus incidence, measured by counting the number of plants showing virus-like symptoms (leaf mosaic, shoe-stringing), ranged from 45 to 77% (Table 3). Virus incidence was 20 to 30% lower in 'Liberator III' and 'Destiny III' compared to the susceptible controls.

The increased yield of marketable fruit and the reduction in plants exhibiting virus-like symptoms observed with 'Liberator III' and 'Destiny III' may have been due to their resistance to WMV. 'Liberator III' and 'Destiny III' are marketed as resistant to WMV, ZYMV, and CMV. The apparent high level of PRSV in the test makes it difficult to draw definite conclusions from the results.

Results indicate that the summer squash varieties evaluated in these trials and marketed as virus-resistant may indeed be effective in reducing incidence of virus diseases and increasing yields of marketable fruit. However, due to the presence of other plant viruses (in this study, PRSV) their effectiveness may be diminished. These varieties should be studied further when they are grown under an Integrated Pest Management (IPM) program that targets all plant viruses by incorporating other IPM practices such as using reflective mulch and/or row covers. Combining IPM practices may further increase yields and reduce virus disease incidence.

EVALUATION OF ZUCCHINI VARIETIES WITH RESISTANCE TO MULTIPLE VIRUSES COMMON IN ALABAMA

Edward Sikora, John F. Murphy, Jason Burkett, and Tony Dawkins

Recently, Asgrow released two medium green zucchini varieties ('Declaration II' and 'Independence II') with resistance to watermelon mosaic virus (WMV) and zucchini yellow mosaic virus (ZYMV). These viruses are common problems in Alabama and cause a significant amount of yield suppression. This study was initiated to determine how well these varieties produce in Alabama and how well their resistance holds up to the virus strains found here. Results showed that virus incidence was 10 to 20% lower in 'Declaration II' and 'Independence II' compared to virus-susceptible control varieties. The increased yield of marketable fruit and the reduction in plants exhibiting virus-like symptoms may have been due to their resistance to WMV.

In 1999, this study was conducted at the E. V. Smith Research Center (EVSRC) in Shorter, Alabama, and at the Sand Mountain Research and Extension Center (SMREC) in Crossville, Alabama. The virus resistant varieties 'Declaration II' and 'Independence II' and two susceptible control varieties ('Sensation' and 'Senator') were direct seeded in early July at each site. Plants were monitored during the season for the presence of virus symptoms. At harvest, the number of marketable fruit produced and the marketable fruit weight were determined. Also at harvest, plants at each site were tested for the presence of CMV, WMV, ZYMV, and Papaya Ringspot Virus (PRSV).

At SMREC, virus symptoms were not observed in the virus-susceptible zucchini varieties, indicating that there was little to no virus disease pressure at this location. Yield data were taken to determine the yield potential of the four zucchini varieties in the absence of virus pressure (Table 1). Results show that there were no significant differences in the number of marketable fruit produced, or in marketable fruit weight, among the varieties. This indicates that the virus-resistant varieties produced as well as the virus-susceptible varieties in the absence of virus diseases.

At EVSRC heavy virus disease pressure was observed. PRSV and WMV appeared to be the most prevalent viruses present based on analysis of zucchini plants showing virus-like symptoms. WMV and PRSV were detected in 100 and 97.5% of the plants tested, respectively. ZYMV was detected in 17.5% of the plants tested. CMV was not detected at this location.

'Independence II' and 'Declaration II' produced the highest total fruit weights among the zucchini varieties, but differences were not statistically significant (Table 2). 'Independence II' produced a significantly higher marketable fruit weight than 'Sensation' and 'Senator.' 'Declaration II' produced a significantly higher marketable fruit weight than 'Senator.' There were no significant differences between 'Sensation' and 'Senator.'

Virus incidence, measured by counting the number of plants showing virus-like symptoms (leaf mosaic, shoe-stringing), ranged from 72 to 95% (Table 3). Virus incidence was 10 to 20% lower in 'Declaration II' and 'Independence II' compared to the susceptible varieties.

The increased yield of marketable fruit and the reduction in plants exhibiting virus-like symptoms observed with the zucchini varieties 'Independence II' and 'Declaration II' may have been due to their resistance to WMV. 'Independence II' and 'Declaration II' are marketed as resistant to WMV and ZYMV. WMV and PRSV were detected in nearly 100% of the zucchini plants tested, regardless if they were considered resistant or susceptible. The high level of PRSV in this test also makes it difficult to make clear cut conclusions from our results.

Results indicate that the zucchini varieties evaluated in these trials and marketed as virus-resistant may indeed be effective in reducing incidence of virus diseases and increasing yields of marketable fruit. However, due to the presence of other plant viruses (in this study, PRSV) their effectiveness may be diminished. These varieties should be studied further when they are grown under an Integrated Pest Management (IPM) program that targets all plant viruses by incorporating other IPM practices such as using reflective mulch and/or row covers. Combining IPM practices may further increase yields and reduce virus disease incidence.

TABLE 1. YIELD DATA, ZUCCHINI TRIAL, SAND MOUNTAIN RESEARCH AND EXTENSION CENTER, CROSSVILLE, ALABAMA, 1999

Variety	Marketable fruit number	Marketable fruit weight (g/plot)
Declaration II	26.0 a	7,735 a
Independence II	23.4 a	7,798 a
Sensation	22.2 a	5,940 a
Senator	33.4 a	9,153 a

Numbers followed by the same letter are not significantly different.

TABLE 2. YIELD DATA, ZUCCHINI TRIAL, E. V. SMITH RESEARCH CENTER, SHORTER, ALABAMA, 1999

Variety	Marketable fruit weight (g/plot)	Unmarketable fruit weight (g/plot)	Total fruit weight (g/plot)
Declaration II	7,688 ab	11,788 a	19,476 a
Independence II	8,632 a	10,820 a	19,452 a
Sensation	4,686 c	10,100 a	14,786 a
Senator	5,144 bc	9,722 a	14,866 a

Numbers followed by the same letter are not significantly different.

TABLE 3. VIRUS INCIDENCE, ZUCCHINI TRIAL, E. V. SMITH RESEARCH CENTER, SHORTER, ALABAMA, 1999

Variety	Total plants rated	% of plants exhibiting virus-like symptoms
Declaration II	46	82.6
Independence II	46	71.7
Sensation	47	93.6
Senator	43	95.3

Evaluation of TerraPy B, Magic Wet, OMC 1054, and OMC 1056 for Control of Southern Blight and Root-knot Nematode on Tomato

Edward Sikora, Joseph Kemble, and Tony Dawkins

TerraPy B, Magic Wet, OMC 1054, and OMC 1056 are organic products that have been shown to reduce plant stress and plant disease activity by stimulating soil microbiological activity and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if these products would reduce damage from southern blight and root-knot nematode, two common soil-borne diseases of tomato in Alabama. Results indicate that the products used alone or in combination did not reduce southern blight incidence. Because of severe early season damage from southern blight, it was difficult to determine the effects of the products on root-knot nematode damage. There was no apparent effect on early season growth promotion among the treatments.

This test was conducted in 1999 at the Sand Mountain Research and Extension Center in Crossville, Alabama. The tomato 'Mountain Spring' was transplanted into the field in early June. Treatments were applied at-planting or as foliar sprays during the season. All plots were sprayed weekly with ManKocide as part of a standard fungicide program. Plants were ranked for growth promotion/plant health four weeks after transplanting using a 1 to 5 scale. Incidence of southern blight was determined at mid season and during harvest. Five plants per plot were excavated at last-picking and their roots were rated for root-knot nematode galling. Tomatoes were harvested over a five-week period.

The only significant differences in southern blight incidence were between the TerraPy B 20 gram treatment (81.5%) and the TerraPy B 10 gram (39.8 %) and the TerraPy B 10 gram + Vydate L (35.4 %) treatments (Table 1). There were no significant differences in the incidence of southern blight among the other treatments. Root-knot nematode damage was relatively low and the nematode population was quite variable throughout the test plot. Because southern blight killed a large number of plants early in the season, a significant number of plots could not be rated for root-knot damage at harvest, resulting in inconclusive data.

The only significant difference in growth rating was between the Vydate L control treatment and the OMC 1054 + TerraPy B 20 gram + Magic Wet treatment (Table 2). There were no significant differences in yield among the treatments (data not shown).

Table 1. Effect of TerraPy B, Magic Wet, OMC 1054 and OMC 1056 on Southern Blight and Root-knot Nematodes Damage on Tomato, Sand Mountain Research Station, Crossville, 1999

Treatments [1]	Rate	% southern blight *(Sclerotium rolfsii)* [2]	Root-knot root rating [3]
Vydate L	1.9 L/ac	58.6 ab	1.8 bc
Urea	4 g/m^2	50.8 ab	6.5 abc
TerraPy B	20 g/m^2	81.5 a	0.2 c
TerraPy B	10 g/m^2	39.8 b	19.0 ab
TerraPy B + Vydate L	20 g/m^2 0.473 L/ ac	58.6 ab	2.1 bc
TerraPy B + Vydate L	10 g/m^2 0.95 L/ac	35.4 b	5.2 bc
Magic Wet	2 g/m^2	60.0 ab	2.6 bc
TerraPy B + Magic Wet	20 g/m^2 2 g/m^2	63.0 ab	2.0 bc
OMC 1054 + TerraPy B + Magic Wet	30 g/m 20 g/m^2 2 g/m^2	57.0 ab	9.7 abc
OMC 1056	0.2 g/m^2	57.0 ab	24.0 a
LSD (P=0.05)		32.6	18.3

[1] All treatments applied as a transplant drench with the exception of the Vydate L. Vydate L was applied as a foliar spray every seven days during the season.
[2] % southern blight/replication at mid harvest, August 23.
[3] % of roots with RKN galls at final harvest.

Table 2. Effect of TerraPy B, Magic Wet, OMC 1054 and OMC 1056 on Early Season Growth of Tomato, Sand Mountain Research Station, Crossville, 1999

Treatments [1]	Rate	Growth rating (1-5) [2]
Vydate L	1.9 L/ac	4.2 a
Urea	4 g/m^2	3.8 ab
TerraPy B	20 g/m^2	3.4 ab
TerraPy B	10 g/m^2	4.0 ab
TerraPy B + Vydate L	20 g/m^2 0.473 L/ac	3.4 ab
TerraPy B + Vydate L	10 g/m^2 0.95 L/ac	3.4 ab
Magic Wet	2 g/m^2	3.0 ab
TerraPy B + Magic Wet	20 g/m^2 2 g/m^2	3.6 ab
OMC 1054 + TerraPy B + Magic Wet	30 g/m 20 g/m^2 2 g/m^2	2.6 b
OMC 1056	0.2 g/m^2	3.6 ab
LSD (P=0.05)		1.4

[1] All treatments applied as a transplant drench with the exception of the Vydate L. Vydate L was applied as a foliar spray every seven days during the season.
[2] Plants were ranked for growth promotion/health approximately four weeks after transplanting. A rating of 3.5 is considered normal. A rating lower than 3.5 represents poor plant growth.

EVALUATION OF TERRAPY B FOR GROWTH PROMOTION AND ROOT-KNOT NEMATODE CONTROL ON TOMATO

Edward Sikora and Arnold Caylor

TerraPy B is an organic product that has been shown to reduce plant stress and plant disease activity by stimulating soil microbiological activity and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if this product would reduce root-knot nematode activity on tomato and/or increase yield. Results on the ability of TerraPy B to control root-knot nematode were inconclusive because of the low root-knot nematode population present in the experimental field. There was a slight yield increase with one TerraPy B treatment compared to the industry standard; however, in most cases, there did not appear to be a significant yield response to the product.

This test was conducted in 2000 at North Alabama Research Station in Cullman, Alabama. The tomato 'Floralina' was transplanted into the field on May 16. Plants were grown on raised beds covered with a white plastic mulch and drip irrigated. Treatments other than the methyl bromide standard were applied as a soil drench on the day of transplanting. A second application of TerraPy B at 10 grams per square meter was applied as a soil drench in one treatment on June 13 (see table). Soil samples were taken after harvest and analyzed for nematodes. Six plants from each plot were excavated after harvest and their root systems were rated for root-knot nematode damage on a 1 to 10 scale. Tomatoes were harvested twice a week for two weeks and total fruit weight was determined.

The root-knot nematode population was relatively low and widely dispersed in the field. Because of this, TerraPy B's ability to control root-knot nematode on tomato was difficult to determine. There were no significant differences in terms of the root-knot damage rating or in the root-knot nematode population at harvest (see table).

THE EFFECT OF TERRAPY B ON YIELD OF TOMATO AND ROOT-KNOT NEMATODE, CULLMAN, ALABAMA, 2000

Treatments/ rate (g/ml/water) [1]	Total fruit weight (lb/plot)	Root-knot damage rating	Final root-knot population
Control (urea) (4 g/m^2)	43.9 ab	0.7 a	67.3 a
Methyl bromide	36.7 b	0.3 a	0.0 a
TerraPy B (20 g/m^2)	43.1 ab	0.2 a	9.6 a
TerraPy B (10 g/m^2)	44.5 ab	0.4 a	8.6 a
TerraPy B (2 g/m^2)	42.5 ab	0.7 a	34.0 a
TerraPy B (10 g/m^2)[2]	47.5 a	0.4 a	0.6 a

[1] TerraPy B treatments were applied in 250 ml of water as a soil drench at the time of transplanting treatment.
[2] Was applied in 250 ml of water as a soil drench at transplanting and four weeks after transplanting.
Numbers followed by the same letter are not significantly different.

In terms of yield, the only significant difference was between TerraPy B at 10 grams per square meter applied at planting and again four weeks later, and the methyl bromide treatment (see table). There were no significant differences among the other treatments.

With the relatively low nematode population in the field, a yield increase with the TerraPy B treatments was expected. Unfortunately, the apparent growth enhancing effect of the low rate of TerraPy B (two grams per square meter) used in this trial was not observed as it had been in a cucumber trial conducted in a neighboring field. TerraPy B at 10 grams per square meter applied twice (at planting and four weeks later) did have the highest yield among the treatments, though only significantly higher than the methyl bromide standard.

Evaluation of TerraPy B, Magic Wet, OMC 1054, and OMC 1056 for Control of Early Blight and Southern Blight on Tomato

Edward Sikora, Joseph Kemble, and Tony Dawkins

TerraPy B, Magic Wet, OMC 1054, and OMC 1056 are organic products that have been shown to reduce plant stress and plant disease activity by stimulating soil microbiological activity and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if these products, when used in conjunction with standard disease control practices, would reduce disease incidence and severity and/or increase yield of tomato in Alabama. Results from this study indicate that the products used alone or in combination with one another did not reduce disease damage or increase yield of tomato. Magic Wet used alone had the highest level of early blight severity among the treatments tested.

This test was conducted in 1999 at the Sand Mountain Research and Extension Center in Crossville, Alabama. The tomato 'Mountain Spring' was transplanted into the field in early June. Treatments were applied at-planting or as a foliar sprays during the season. All plots were sprayed weekly with ManKocide as part of a standard fungicide program. Incidence of southern blight (a soil-borne fungal disease) and severity of early blight (a foliar fungal disease) was determined biweekly after the diseases were first observed in the test plots. Tomatoes were harvested once a week for five weeks.

There were no significant differences in the incidence of southern blight among the treatments. TerraPy B 20 grams + Vydate L, TerraPy B 20 grams + Magic Wet, and OMC 1056 had significantly less early blight damage than Magic Wet alone (see table). There were no significant differences among the other treatments. There was no significant differences among the treatments in terms of yield or fruit quality (data not shown).

Effect of TerraPy B, Magic Wet, OMC 1054 and OMC 1056 on Incidence of Southern Blight and Severity of Early Blight on Tomato, Sand Mountain Research Station, Crossville, Alabama, 1999

Treatments [1]	Rate	% Southern blight [2]	% Early blight [3]
Vydate L	1.9 L/ac	12.3 a	15.4 ab
Urea	4 g/m^2	16.9 a	20.6 ab
TerraPy B	20 g/m^2	13.8 a	18.0 ab
TerraPy B	10 g/m^2	27.6 a	16.8 ab
TerraPy B + Vydate L	20 g/m^2 0.473 L/ ac	10.7 a	13.8 b
TerraPy B + Vydate L	10 g/m^2 0.95 L/ac	15.3 a	19.8 ab
Magic Wet	2 g/m^2	20.0 a	23.2 a
TerraPy B + Magic Wet	20 g/m^2 2 g/m^2	20.0 a	13.8 b
OMC 1054 + TerraPy B + Magic Wet	30 g/m 20 g/m^2 2 g/m^2	20.0 a	18.0 ab
OMC 1056	0.2 g/m^2	16.9 a	15.0 b
LSD (P=0.05)		19.2	7.9

[1] All treatments applied as a transplant drench with the exception of the Vydate L. Vydate L was applied as a foliar spray every seven days during the season.
[2] % southern blight/replication at mid harvest, August 23.
[3] % of tissue damaged/replication at mid harvest, August 23.

EVALUATION OF TERRAPY B FOR ROOT-KNOT NEMATODE CONTROL OF IRISH POTATO

Edward Sikora and Arnold Caylor

TerraPy B is an organic product that has been shown to reduce plant stress and plant disease activity by stimulating soil microbiological activity and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if the product would reduce root-knot nematode damage and/or increase yield of Irish potatoes. Results indicate that TerraPy B had some effect on root-knot nematode damage but did not increase yields.

The test was conducted in 1999 at the North Alabama Research Station in Cullman, Alabama. Potato seed pieces of 'LaRouge' were set in a root-knot nematode infested field in April. All treatments were applied at-planting including the standard nematicide treatment (Mocap). Soil samples were taken at-planting and at harvest and analyzed for nematodes. Potatoes were harvested and total yield and tuber damage from root-knot nematodes were determined.

Results showed that there were no significant differences in the root-knot nematode tuber damage rating, the root-knot nematode population at harvest, or the yield (see table). However, the urea control had the highest level of tuber damage and the highest root-knot nematode population at harvest. In general, the TerraPy B treatments performed as well as the Mocap standard in reducing the root-knot nematode population and in reducing tuber damage. There were no observable differences in plant growth or plant health among the treatments during the season. Nor were any foliar diseases in the plots observed during the experiment.

EFFECT OF TERRA PY B ALONE OR IN COMBINATION WITH MOCAP ON ROOT-KNOT NEMATODE POPULATIONS AND IRISH POTATO PRODUCTION, NORTH ALABAMA RESEARCH STATION, CULLMAN, 1999

Treatments/ rate [1]	Tuber damage rating[2]	RKN index[3]	Tuber weight [4]
Terra Py B (20 g/m^2)	32.6 a	5.6 a	8,489 a
Terra Py B (20 g/m^2) + Mocap 10G (286 g/300m row)	34.6 a	12.9 a	8,217 a
Terra Py B (10 g/m^2) + Mocap (10G 477 g/300m row)	31.3 a	6.2 a	7,264 a
Urea (4 g/m^2)	39.6 a	17.1 a	10,623 a
Mocap 10G (953 g/300 m row)	30.5 a	8.8 a	11,577 a

[1] All TerraPy B treatments and urea applied as soil drench in one liter of water/ one meter of row.
[2] % of tuber surface with visible symptoms of root-knot nematode damage.
[3] RKN index = nematode population at harvest divided by population at-planting RKN population at-planting ranged from 398 to 1,039 individuals/100 cc of soil. RKN population at harvest ranged from 3,328 to 4,833/100 cc of soil.
[4] Grams/ six meters of row. The majority of potatoes harvested were of similar size (grade B).
Numbers followed by the same letter are not significantly different.

EVALUATION OF TERRAPY G FOR INCREASING YIELD OF CORN

Edward J. Sikora and Chet Norris

TerraPy G is an organic product that has been shown to reduce plant stress and plant diseases by stimulating soil microbiological activity and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if this product would increase yield and reduce seedling disease and stalk rot incidence on corn. Extremely dry conditions and a late planting data resulted in very poor yields. There were no significant differences among the treatments tested. Neither seedling diseases nor stalk rot were major disease problems in the test, possibly due to the very dry conditions in 2000.

This experiment was conducted at the Tennessee Valley Research and Extension Center in Bell Mina, Alabama. The corn variety Pioneer 32K62 was planted on June 13. Treatments were applied broadcast at planting. Fertilizer applications were determined by soil test information. The corn was not irrigated and rainfall at the test site consisted of 8.8 cm in June, 1.8 cm in July, 6.7 cm in August, 4.34 cm in September, and 0.05 cm in October.

A plant stand count (total number of plants that emerged from the ground) was taken on July 5. Foliar disease and stalk rot ratings were to be taken during the season; however, very little disease was observed in the plots. The test was harvested on October 30 and yield was determined.

TerraPy G at the 3.5 and five gallon per acre rate had a significantly lower plant stand than the control treatment (see table). There were no significant differences among the TerraPy

G treatments with regards to plant stand. There were no significant differences in yield among the treatments (see table). TerraPy G at two gallons per acre produced the highest yield.

The experiment was planted on June 13. This is approximately six weeks after the latest recommended planting date for corn for this region of Alabama. The late planting date exposed the plants to extremely high summer temperatures and very dry conditions for most of the experiment. This resulted in plant stress and low yields. Yields in this test were approximately 75% below the average for the area. Because of the late planting date and the drier than normal conditions for the area, this was probably not a fair test of TerraPy G.

Effect of TerraPy G on Corn Yield, Bell Mina, Alabama, 2000

Treatments [1]	Rate (gal/acre)	Plant stand count	Yield (bushels/acre)
Control	—	112.5 a	23.9 a
TerraPy G	2.0	106.7 ab	24.5 a
TerraPy G	3.5	102.7 b	23.5 a
TerraPy G	5.0	103.0 b	23.2 a

[1] Numbers followed by the same letter are not significantly different.

Evaluation of Terra Control for Growth Promotion on Corn

Edward J. Sikora and Tony Dawkins

Terra Control is an organic product that has been shown to reduce plant stress by stimulating soil microbiological activity, reducing water loss and promoting nutrient uptake on various horticultural and agronomic crops in Europe. The objective of this study was to determine if this product would increase yield and reduce seedling disease and stalk rot incidence on corn. Results showed that Terra Control at 7.5 gallons per acre gave the greatest yield response. Neither seedling diseases or stalk rot were major disease problems in the test, possibly due to the very dry conditions in 2000.

The experiment was conducted at the Sand Mountain Research and Extension Center in Crossville, Alabama. The experiment was planted on June 14 with the variety 'Pioneer 32K61'. Treatments were applied broadcast at planting. Fertilizer applications were determined by soil test information and the corn was irrigated during extended periods of dry weather.

A plant stand count (total number of plants that emerged from the ground) was taken on July 5. Foliar disease and stalk rot ratings were to be taken during the season; however, very little disease was observed in the plots. The test was harvested on October 12 and yield was determined.

There were no significant differences in plant stand counts among treatments (see table). Terra Control at 7.5 gallons per acre produced the greatest yield among treatments. Yield production in the Terra Control 7.5 gallons per acre treatment was five bushels per acre greater than the control treatment.

Effect of Terra Control on Growth Promotion of Corn, Crossville, Alabama, 2000

Treatments	Rate (gal/acre)	Plant stand count	Yield (bushels/acre)
Control	—	117.0 a	128.1 a
Terra Control	5.0	114.0 a	124.4 a
Terra Control	7.5	114.3 a	133.3 a
Terra Control	10.0	111.6 a	126.0 a

Numbers followed by the same letter are not significantly different.

The experiment was planted approximately six weeks after the latest recommended planting date for corn for this region of Alabama. The late planting date exposed the plants to extremely high summer temperatures and very dry conditions. Fortunately, the test was irrigated during extended periods of dry weather, which resulted in relatively good yields.

It would be interesting to see the effect of Terra Control on yield on nonirrigated corn when planted at the proper time of year. Most corn grown on neighboring farms that was planted earlier (April) died due to lack of rainfall. Terra Control's soil moisture retention capability may have been of great benefit to farmers with nonirrigated corn under these extremely dry conditions.

Alabama's Agricultural Experiment Station System
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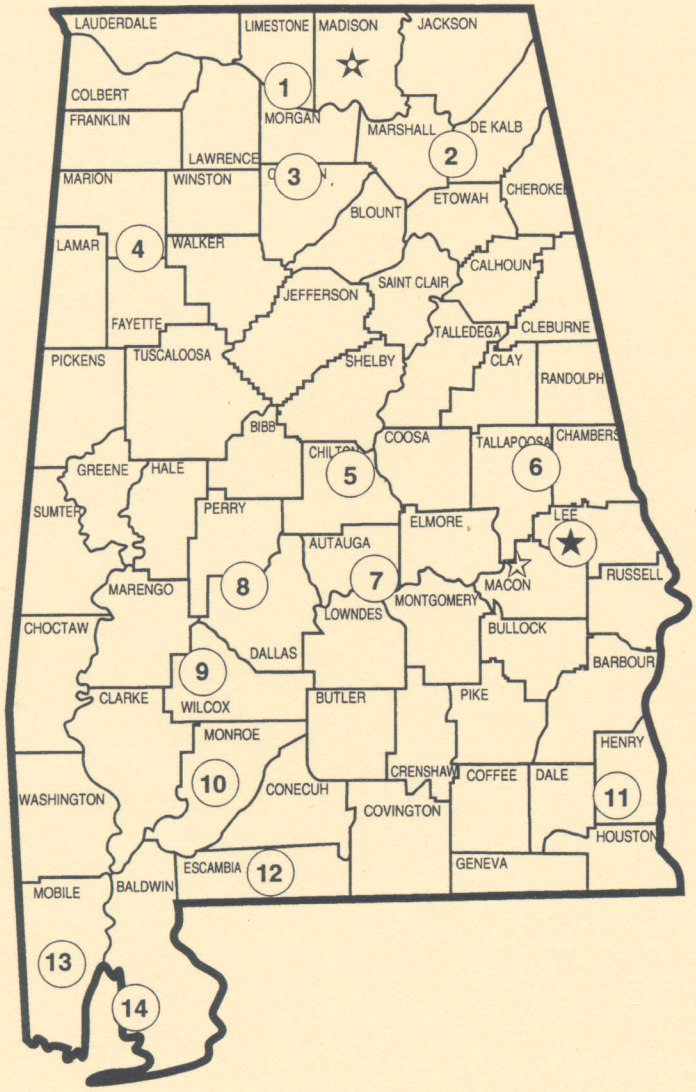

★ Main Agricultural Experiment Station, Auburn.

☆ Alabama A&M University

☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Research and Extension Center, Belle Mina
2. Sand Mountain Research and Extension Center, Crossville
3. North Alabama Horticulture Station, Cullman
4. Upper Coastal Plains Station, Winfield
5. Chilton Area Horticulture Station, Clanton
6. Piedmont Research Station, Camp Hill
7. Prattville Experiment Field, Prattville
8. Black Belt Research and Extension Center, Marion Junction
9. Lower Coastal Plain Research Station, Camden
10. Monroeville Experiment Field, Monroeville
11. Wiregrass Research and Extension Center, Headland
12. Brewton Experiment Field, Brewton
13. Ornamental Horticulture Station, Spring Hill
14. Gulf Coast Research and Extension Center, Fairhope