3-1981

Blueberry Progress Reports

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BLUEBERRY PROGRESS REPORTS

MAINE LIFE SCIENCES AND AGRICULTURE EXPERIMENT STATION

and

MAINE COOPERATIVE EXTENSION SERVICE

Prepared for

THE MAINE BLUEBERRY COMMISSION

and the

UNIVERSITY OF MAINE BLUEBERRY ADVISORY COMMITTEE

March 1981

R E P O R T S

Weed Control in Lowbush Blueberry Fields

Personnel:

Amr A. Ismail, David E. Yarborough, Delmont C. Emerson

Mission of Project:

To improve blueberry production and facilitate harvesting by developing new or improved methods of controlling weeds in lowbush blueberry fields.

Specific Objectives:

1. Evaluate herbicides for the control of grasses, sedges, and flowering herbaceous weeds (goldenrod, etc.).

2. Evaluate herbicides for the control of woody weeds (hardhack or meadowsweet, barrenberry, poplar, etc.).

3. Develop or improve equipment and methods for application of herbicides for selective control of weeds in lowbush blueberry fields. Emphasis is to reduce amount of herbicides used, and minimize effect on non-target areas.

Status of Current Research:

1. Hexazinone (Velpar) was applied pre-emergent at 0, 1, 2, 4, or 8 Lb/A with 50 Lb/A N to a commercial lowbush blueberry field in Jonesport in May of 1980. Visual observations of blueberry stand, herbicide injury to blueberries, grass control and counts of Spirea (hardhack and meadowsweet) and Solidago (golden rods) were made over the summer of 1980. Data are currently being summarized and analyzed. Blueberry stem samples were obtained in the fall of 1980 and are being counted and measured, yields and residue samples will be taken in August, 1981.

2. Hexazinone was applied pre-emergent at 0, 2, 4, or 6 Lb/A to a lowbush blueberry field in Deblois with a heavy Spirea population in May of 1980. Spirea plant stand was counted before pruning and after treatment. Visual observations of blueberry stand, herbicide injury to blueberries, grass control and counts of Spirea and Solidago were made in the summer of 1980. Data are being summarized and analyzed. Blueberry plant stand samples were obtained but coverage was poor. Yields and residue samples will be taken in August, 1981.

3. Hexazinone at 0, 1, 2, 4 Lb/A by 0, 45, 90 Lb/A N was applied as a split block on 5 commercial lowbush blueberry fields in May of 1980. Visual observations of blueberry stand, herbicide injury to blueberries, grass control, and counts of Spirea and Solidago were made in the summer of 1980. Data are being summarized and analyzed. Blueberry stem samples were obtained in the fall of 1980 and are being counted and measured. Yields and residue samples will be taken in August, 1981.

4. An experiment to test the effects of Asulam (Asulox) on braken fern was initiated in 1979 and completed in 1980. Mid-summer application of asulam significantly reduced the number of braken fern fronds emerging the year after application. A linear decline of 27% to 95% reduction in braken fronds corresponded to the 0 to 6.7 Lb/A rates of asulam applied. Results were reported in the Proceedings of the Northeast Weed Science Society, Vol. 35:353-355, 1981.

Impact of Research:

This research provides essential information on the ability of certain herbicides to control specific weeds, and the effect of their application on blueberry plant growth and yield.

Blueberry growers will benefit by being able to control certain weeds in blueberry fields, improve their productivity, increase ease of harvesting, reduce costs, and improve the quality of the blueberry pack.

Research Plans for 1981:

1. Continue existing experiments:

   A. Spirea and Solidago control with hexazinone in Jonesport.

   B. Spirea control with hexazinone in Deblois.

   C. Spirea and Solidago control with hexazinone in 5 locations (Aurora -2, Centerville, Hancock, Orland).

   D. Barrenberry control with endothall and glyphosate in Deblois.

   E. Poplar control with several herbicides in Columbia Falls.

2. Initiate additional experiments at various locations (in Washington, Hancock and Knox Counties) to evaluate the effect of hexazinone and fertility on weed and lowbush blueberry growth. Hexazinone will be applied at 0, 0.5, 1, 2 Lb/A with fertilizer at 0, 45, 90 Lb/A N. An attempt will be made to establish plots on locations with different soil types to provide a wide data base for statewide recommendation.

3. Evaluate timing and rates of dichlorbenil (casoron) for spot treatment of braken fern control in lowbush blueberries. Casoron G-4 will prevent growth of emerging sprouts of braken fern and is currently labelled for use in blueberries but the most efficient time and rate of application needs to be established for lowbush blueberries.

4. An experiment to comapre the efficacy of cutting, cutting the stump then spraying with 2,4-D in oil, or the placement of hexazinone (10% active) pellets for controlling woody weeds in lowbush blueberry fields will be initiated in the summer of 1981. In order to obtain a wide spectrum of woody weeds and field conditions, the treatments will be replicated in several commercial lowbush blueberry fields. Target plant species will be those that grow in discrete clumps such as maple, oak, willow, birch and cherry.

Significant Research Accomplishments:

1. A study which evaluated the effects of a 6-foot wide rotary mower versus oil burning with 3 rates of fertilizer and 4 rates of terbacil was recently published in the Canadian Journal of Plant Science Vol. 61:61-71, 1981. The results indicated that burned plants produced twice as many blueberries as those mowed, and high rates of fertilizers depressed yields of burned plants but not of mowed plants. Increasing the rate of terbacil from 0 to 3.2 lb/A increased yield on burned plants but not on the mowed. The study suggested that a system to prune blueberry plants close to the ground level is needed.

2. Lowbush blueberry plants were pruned mechanically by flail mowing or thermally by oil burning in the spring and fall. Plant growth pattern, vigor, and flower bud production were determined after one growing season. The incidence of winter injury to flower primordia and berry yields were also determined. The total number of stems produced was not affected by the pruning treatments, but the growth habit of stems was influenced by the method and time of pruning. The pruning treatments had no influence on the incidence of winter injury to flower primordia. Burning resulted in more flower buds per ft^2 than mowing. The berry yields were not influenced by the method or time of pruning. Results will be submitted to the Canadian Journal of Plant Science for publication.

3. Soil samples and blueberry leaf tissue samples were collected from the plots pruned by oil burning or flail mowing. Pruning treatments had no influence on amount of soil organic matter or pH. Leaf samples obtained one year after pruning from burned plants contain higher concentrations of nitrogen and phosphorus but lower calcium than from mowed plants. Nutrient concentrations taken 2 years after pruning were not affected by the pruning treatments. Results will be submitted to the Canadian Journal of Plant Science for publication.

4. A cost analysis was constructed for 6 pruning procedures with 3 operation sizes. Procedures included straw burning (manual and mechanical), oil burning (with conventional, "economy" and "Bosse" burner heads) and flail mowing. Flail mowing was the least expensive and time consuming of all pruning procedures. Results will be published in a Life Sciences and Agriculture Experiment Station bulletin.

5. Plant stand and yield were sampled from 1978 to 1981 in three commercial fields in Jonesboro, T-18, and Ellsworth which were pruned by fire or flail mowed. No significant differences in yields were obtained due to pruning method.

Impact of Research:

Burning with fuel oil is currently the most practical method of pruning blueberries but is costly and destructive to the organic material on the surface of the soil. Fuel oil is a nonrenewable resource that is rapidly increasing in cost and in the future may become less readily available.

This research provides information on the effectiveness and practicality of different pruning methods and equipment. With improvements in weed control practices and fertility management, it may become possible to reduce the frequency of burning (possibly every 3 or 4 years) or substitute mowing for burning as a pruning method. The development of a more efficient burner would help reduce production cost and conserve energy. The development of suitable flail mowing equipment would reduce reliance on burning for pruning blueberries and would significantly reduce pruning cost.

Summary Report
1980 Integrated Pest Management for Blueberries in Maine

by
Amr A. Ismail
Extension Blueberry Specialist

The blueberry fruit fly Rhagoletis mendax is a major insect pest of the lowbush blueberry in Maine. The fly deposits a single egg within the blueberry. The developing larvae, if found in sufficient quantities, would cause condemnation of the fruit in interstate shipment. Most of the 20,000 acres of blueberry fields harvested annually are treated with aerial applications of Azinophos-methyl (Guthion) to prevent larval contamination in the blueberries. There is a need to develop methods to reduce or eliminate unnecessary pesticide use.

Research findings at the University of Maine at Orono pointed out that monitoring for the presence of the fruit fly in the field can serve to determine when and if pesticide application is necessary. A tentative action threshold of 3 to 5 flies per trap was identified. In 1980 a pest management program for the blueberry fruit fly was initiated to:

A. Reduce or eliminate, if possible, the use of insecticides for blueberry fruit fly control while maintaining fruit quality.

B. Educate and obtain cooperation from blueberry growers and concerned citizens for the attainment of a viable and effective pest management program.

Fourty-seven fields were selected for the 1980 project from 75 respondents to a mail survey sent to blueberry growers by the Cooperative Extension Service. Field size ranged from 3 to 450 acres with a total of 1661 acres. Six fields totaling 1047 acres were located in the blueberry barrens in Washington County and 41 smaller fields totaling 614 acres in Washington and Hancock Counties. Fruit fly presence was monitored using Pherocon AM Insect Traps (Zoecon Corp.) with an average of 1 trap for every 2 acres. As many as 3 traps per acre were used on the smaller fields while 1 trap for every 10 acres was used on the largest field. Three scouts checked traps for flies at 3 to 5 days intervals and changed traps every 2 weeks throughout the monitoring period. When counts above the tentative threshold were found, the grower was contacted and advised of his alternatives.

Monitoring of the fields began on June 23, 1980. Flies were first captured on July 2 but the majority did not appear until the second week of July. Fly captures increased rapidly after their first appearance. More than half the traps captured no flies and over 80% of the traps captured two or less flies.

Traps in the fields on the barrens were catching flies in increasing numbers before the first insecticide application period. After treatment with guthion, fly captures were reduced for one week then began increasing in numbers before the second application period. In certain small fields the first insecticide application was made before fly emergence. No benefit would be obtained from such a treatment.

Fly captures did not reach the tentative threshold uniformly throughout the entire fields. Some traps in some sections of the fields exceeded it. The large number of traps which captured no flies on fields which had other traps capturing many flies indicates that a better knowledge of trap placement and fly distribution within the fields is needed. Determination of emergence dates and fly population data from all major blueberry growing regions of Maine are needed before a state-wide IPM program can be effectively implemented.

Fruit samples were obtained from trap sites at harvesting time. Larvae numbers in the berries were determined by the standard method used by inspectors at blueberry receiving stations. Twenty of the test fields had larva in berry samples collected at trap sites. The fruit fly larva counts taken from berry samples at the trap sites did not agree with the larva counts taken from the berries at the receiving stations. Higher counts were obtained around the trap sites which may have been due to trap attracting more flies to it. A survey of blueberry receiving stations indicated that the presence of 5 to 15 larvae per quart was typical for infested berries on non-treated fields. Larva counts of up to 50 per quart were reported. The presence of 4 larvae per quart at trap sites was not found until fly counts exceeded 6-10 per trap indicating that a higher action threshold may be warranted.

The results of the monitoring program indicate that reductions in use of insecticides can be made by trapping to determine fly populations. Knowledge of the dates of emergency and fly population density may be used to reduce the amount of insecticide used. The active threshold should be refined to predict fruit fly larvae counts at the factory instead of at trap sites.

Insecticide drift was monitored on helicopter, fixed wing air craft and tractor mounted air blast sprayers to determine relative amounts of insecticide deposited within and outside treated fields. A drift control agent Nalcotrol was used by aerial applicators. A Rhodamine B dye was added to the insecticide to determine relative amount of insecticide deposited on the Kromekote spray deposit cards. Insecticide drift down wind (wind 4 to 8 mph) which was 10% or more of the deposit within the fields was found at 100 to 150 feet from field edge for the helicopter and 200 feet with the fixed wing aircraft. No downwind drift above 10% of the field deposit was detected within the air blast sprayer at all test distances, although drift particles were apparent in the air. In all cases, insecticide deposit past 300 feet was 3% of that found in fields.

Cholinesterase enzyme activity was measured for the project leader, three scouts and two ground applicators. It is an accepted indication of exposure to organophosphate insecticides. The project leader blood samples in one test indicated depressed levels of cholinesterase enzyme activity which was attributed to guthion exposure during drift assessment work. No ill effects were felt by him during that period. Results of tests of the other personnel were within the normal variations.

Two hundred and seventy growers attended a Blueberry School that was held at four geographic locations in the blueberry producing areas in the State. At the School, the principles of integrated pest management and the specifics of the blueberry project were discussed by the research entomologist and the Extension blueberry specialist.

During the growing season, three field days were held where growers learned of fruit fly identification, traps placement in the field and progress of the project. Three press conferences were held before, during and after project execution. Articles about the project appeared in all major newspapers in the State and were discussed by the three TV stations in eastern Maine. Several radio interviews and discussions were presented by the Extension specialist on radio stations in Machias, Ellsworth, Bangor and Rockland. Blueberry growers, Maine Blueberry Commission, concerned citizens and environmentalists, the State Board of Pesticide Control, and the Commissioner of the Department of Agriculture, Food and Natural Resources all agree that it was a worthwhile and successful project. They also recommend its continuation and expansion in 1981.

PHYSIOLOGY AND CULTURE OF THE LOWBUSH BLUEBERRY

Personnel:

Project Leader: Dr. John M. Smagula
Research Technician: Edward McLaughlin
Graduate Student: John Frett

Mission of Project:

To develop effective methods of increasing plant cover that will permit more intensive management and increased yields from natural and cultivated blueberry fields.

Specific Objectives:

a) Develop a method for *in vitro* culturing of lowbush blueberry tissue.

b) Study the effect of growth regulator formulations on growth and rhizome production of the lowbush blueberry.

c) Study nutritional responses of the lowbush blueberry in new plantings as related to early establishment.

d) Study the interaction of fertility and pruning practices on soil characteristics and lowbush blueberry growth and yield.

e) Study the effect of N fertilization on clonal spread.

f) Evaluate the growth of lowbush blueberry seedlings in several containerized growing systems and their subsequent establishment in an interclonal field planting.

g) Study the effect of mycorrhizal associations on growth and development of the lowbush blueberry.

Status of Current Research:

a) Tissue culture propagation of the lowbush blueberry using shoot tip culture is being investigated. Graduate student John Frett is completing his MS thesis research which involved altering the growth of adult lowbush blueberry plants to make them more responsive to tissue culture. Treatments included etiolation (growth in the dark), application of Ethrel, a plant growth regulator and low concentrations of glyphosate, an herbicide. He is expected to finish in June, 1981.

leaving about 1/3 of the plants foliage exposed. Plants were dug in the fall and rhizome production was determined. There was no significant effect on rhizome production.

Fruit production in a young field planting diverts energy from vegetative growth and delays establishment. Methods to prevent flowering of flower bud formation are being evaluated. The effect of Gibberellic acid (GA_3) on flower bud formation was studied in an experiment at Blueberry Fill farm. A field planting established in 1979 received GA_3 treatments (0, 500, 1,000, 1,500 or 2,000 ppm) in July, 1980 at the tip dieback development stage. Flower bud formation will be evaluated in the spring, 1981.

f) Several containerized systems for mass production of seedlings are being evaluated. In 1979, Augusta x 4161, 4161 x Augusta and 4161 x 2827 crosses were made. Seeds were extracted from the fruit, treated with GA_3 and sown in flats of sand and peat in the Orono greenhouse. Uniform seedlings were transplanted in the spring, 1980 into 300 cells of each of 5 container types. In September, dry weight measurements were made on 50 randomly selected seedlings from each container type to evaluate growth under greenhouse conditions. In the spring, 1981 200 seedlings from each container type will be planted in a replicated field experiment to evaluate the effect of container type on establishment, and winter survival (frost-heaving).

g) The effect of mycorrhizal associations on growth and development of the lowbush blueberry is being studied. Environmental conditions were apparently poor and few fruiting bodies of fungi were found in blueberry fields this fall. However, collections of Clavaria were made in early November and attempts to obtain pure cultures continue.

In the spring, 1980 seedlings were grown in media inoculated with Pisolithus tinctorius and root sections are being stained to determine if a mycorrhizal association has formed.

Significant Research Accomplishments:

a) Tissue Culture - A method for *in vitro* culturing (cloning) of lowbush blueberry tissue has been developed. Three clones have been successfully multiplied through shoot tip culture. Rooting of shoots has been successful and a field planting of one clone has been established at Blueberry Hill farm.

b) Nutrition - The low rates of fertilizer application (40 lbs. N/A) currently used in established commercial lowbush blueberry fields appears to be inadequate for establishing plants in plowed land.

BLUEBERRY DISEASES: INCIDENCE AND CONTROL

Personnel:

Frank L. Caruso, Michael G. Zuck, Timothy E. Bourett

Mission of Project:

To study the prevalence of diseases of the lowbush blueberry, and to determine the effectiveness of the present means of disease control.

Specific Objectives:

1. Survey blueberry fields for diseases, making observations as to whether cultural practices have effects on the prevalence of particular diseases.

2. Determine the effectiveness of presently utilized control measures against Botrytis spp. (and other pathogens).

3. Screen superior blueberry clones for resistance or susceptibility to Botrytis blight, red leaf, mummy berry in greenhouse tests before plants are set out into field plots.

Status of Current Research:

1. Fifteen lowbush blueberry fields were selected in Washington and Hancock counties to be monitored for disease occurrence throughout the 1980 growing season. Each of the fields selected contained a section which had been burned and a section which had been flail mowed. Transects were marked off in one to two acre plots. Stakes were set in the ground at 7.5 meter (25 ft.) intervals along the transect. Blueberry plants in a .36 m^2 (2 sq.ft.) area adjacent to the stake were examined for disease incidence during the months of May through September. Observations were recorded and particular specimens were brought back to the laboratory for isolation of pathogenic organisms. Blueberry plants were inoculated in the greenhouse to check pathogenicity of isolated organisms.

2. Four experiments were conducted during the 1980 growing season aimed at optimizing the control of Botrytis blossom blight. Each experiment was conducted at two locations; Jonesboro (Blueberry Hill Farm) and Ellsworth (Merrill's Farm). All experiments were conducted under pollenation cages; this was to insure favorable infection conditions for the fungus. Chemical sprays were applied using an air brush type paint sprayer connected to a pressure tank. Disease severity was rated by sampling 10 flowering stems per plot on June 2 and incubating them in plastic bags at 25° C for one week under 12 hr light and 12 hr darkness. Stems were examined for sporulation by the pathogen. The experiments were set up as follows:

b) A significantly lower incidence of Botrytis blight was observed in plots treated with either a a mid or late bloom application of Benlate, as compared with either the early bloom application or check plots. Hence, the later an application of Benlate is made during the bloom period, the lower the infection rate will be for Botrytis. It should be noted that lower levels of Botrytis seen in mid and late bloom application plots may simply reflect higher amounts of Benlate residue present on plants sprayed close to the sampling date.

c) No differences were found among the three spray schedules as far as disease control is concerned. All schedules gave good disease control.

d) Some fungicidal effectiveness was noted for sodium-bicarbonate, although it was inferior to Benlate in controlling Botrytis infection. Results were inconclusive for hydrated lime treatments.

3. No evidence of Benlate tolerance was found among isolates of Botrytis from Blueberry Hill Farm, where Benlate use has been heavy for several years, or among isolates collected from commercial fields. These findings indicate that under current management practices and disease conditions, Benlate is effective when used alone against Botrytis.

Research Plans for 1981:

1. Continue the disease survey initiated in 1980. Additional fields off the barrens may be added to the fifteen fields already under study.

2. Crop losses due to Botrytis will be critically studied to determine the cost-effectiveness of fungicide control measures. Crop losses will be assessed in both burned and mowed acreage.

3. Benlate will be compared to other chemicals with regard to effective control of Botrytis blight. The compound is currently under RPAR and may not be on the market much longer. Alternatives must be ready for registration should this happen.

4. Superior clones will be tested for disease susceptibility/resistance when the plants are ready.

Effect of Plant-Water Stress on "lowbush" Blueberry Growth, Yield and Quality

Personnel:

G. R. Benoit, W. J. Grant, and Amr A. Ismail

Mission of Project:

To develop a water management system that will maximize blueberry production and reduce year-to-year fluctuations in yield.

Specific Objectives:

1. To determine the effect of duration and magnitude of plant-water stress on lowbush blueberry plant growth, fruit bud development, fruit set, yield and quality.

2. To determine the amount and timing of water required for optimum blueberry growth and yield under various soil and climatic conditions.

Status of Current Research:

Greenhouse Study:

A second set of 32 blueberry cuttings from clone 4161 were established in individual, automatically watered pots. These plants have now completed a normal two year growth cycle under controlled soil water levels of .2, .6, 1 and 5 Bars of soil water tension. Plant growth analysis and blossom counts verified the results obtained with the first set of plants grown under the same type of conditions, i.e., potential production is increased 25-35 percent by maintaining soil water at .2 Bars during the first year of the 2-year blueberry growth cycle.

Field Study:

Previously treated selected clones located in Deblois were started through a second growth cycle. Automatic watering to maintain soil water treatments of .2 and .6 Bars of tension or better depending on rainfall and a control treatment receiving no supplemental water was imposed on each clone. Final data consisting of bud and blossom counts for each square foot of treated clone will be collected this coming spring.

Overview:

Two greenhouse and two field evaluations of the effect of soil water maintenance during the first year of the two year blueberry growth cycle will be completed this coming spring. A consolidated report of the results will be completed by mid summer. An evaluation of research results will lead to water management recommendations and provide a basis for future research.

FY - 1980 Blueberry Extension Program Progress Report

Maine Cooperative Extension Service
University of Maine at Orono
Amr A. Ismail
Extension Blueberry Specialist

I. 1. Clientele Problem:

Although commercial lowbush blueberry production in Maine represents a multi-million dollar industry with economic importance to a large number of blueberry producers, pickers, shippers and packers, production efficiency and returns per acre are relatively low. Problems relevant to cultural and field management practices are numerous and range from weed control, pruning, fertility management, using bees for pollination to harvesting methods and fruit quality. Research findings indicate the feasibility of significantly increasing yields in most of Maine blueberry fields if certain cultural practices are adopted. Growers have requested the Extension Service to provide an educational program in blueberry management.

2. Extension Objective:

Provide a formal/informal learning experience for blueberry growers to better educate and equip them to make decisions relevant to the management of their fields and how to improve production and reduce unit (pound) cost. This could be done by holding a Blueberry School.

3. Actions:

a. Members of the University Blueberry Advisory Committee and several growers were asked whether there was a need for holding a Blueberry School. They all identified a need and supported the idea.

b. A Blueberry School was scheduled for three consecutive weeks in March 1980. In order to encourage the largest number of growers and interested people to attend, the school was repeated at four locations: Ellsworth, Machias, Union and South Paris and was scheduled during the evening. The School at South Paris was a one-day-long program. News releases were provided for local papers and regular weekly announcements of the school and topics to be discussed were made through 6 radio stations in different blueberry producing areas in the State.

4. Results:

a. Two hundred and fifty active and potential blueberry growers as well as interested citizens attended the Blueberry School. Ninety five percent of the growers who completed an evaluation questionnaire indicated that they learned new information that will help them make decisions or changes in managing their blueberry fields.

b. The need for continuation of this type of Extension educational activity and additional field days was identified.

c. The need for better grower cooperation and marketing efforts surfaced again.

5. Evaluation:

a. Answers to a questionnaire at the end of the School revealed that ninety nine percent of the growers who completed the questionnaire indicated that it was appropriate for CES to conduct the School; that the School helped them better understand management practices in blueberry production; and that it was a time well spent on their part as well as by CES. They also indicated that it was a proper use of their tax dollar. Growers asked CES to continue this type of educational program in the future.

b. Seventy eight per cent of the respondents learned about the School from the Blueberry Newsletter, ten percent from newspaper articles, five percent from unspecified ways and four per cent from radio announcements. Thirty per cent of the growers attended in Machias, twenty six per cent in Ellsworth, twenty four percent in South Paris and twenty percent in Union. Several growers from New Hampshire, Massachusetts and Connecticut attended the School. Twenty five per cent of the attendants indicated that the 1980 School was their first contact with the University Blueberry Extension Program.

c. One hundred percent of the respondents to the questionnaire indicated that the handout material was helpful. The Extension Blueberry Specialist was rated in his role as a coordinator of the School as follows; prepared for meetings: Excellent 82%, Good 17%, Fair 1%, Poor 0%. Coordination/Organization of School: Excellent 79%, Good 20%, Fair 1%, Poor 0%. General Knowledge of field (subject matter): Excellent 85%, Good 14%, Fair 1%, Poor 0%. The information and presentations of the six topics discussed at the School were rated by 95% or more of the responding attendants as Good or Excellent.

d. The Extension Blueberry Specialist found out that holding this type of a program three nights a week for three consecutive weeks in different locations with many miles in between was hectic and very demanding. The four locations were away from the home office.

II. 1. Clientele Problem:

Blueberry fields in Maine are pruned by fire. Burning blueberry fields has been the accepted and only practical way for pruning these plants. Fuel oil is the most common and widely used source of fuel for burning Maine blueberry fields.

2. Extension Objectives:

Blueberry growers will reduce energy consumption and cost in blueberry production by changing from oil burning to flail mowing for pruning their blueberry fields.

3. Action:

a. Demonstration of mowing equipment and comparison between a mowed as well as properly managed field and a burned one.

b. Provide News releases and media coverage of CES pruning demonstration activity.

4. Results:

a. More than one hundred and fifty growers attended two equipment and pruning demonstrations.

b. News articles appeared in three newspapers and was reported by five radio stations.

c. Approximately twenty growers purchased flail mowing equipment for pruning their blueberry fields. Last fall more than 1000 acres were pruned by mowing instead of fire. Estimated fuel oil savings of 50,000 gallons or 50,000 dollars were realized.

d. Two growers purchased straw spreading machines to spread straw on their fields and reduce reliance on fuel oil for burning.

e. It is estimated that in the next 3-5 years Maine blueberry growers will shift a large acreage to flail mowing instead of burning as a pruning method. Estimates are of savings in fuel oil of approximately 200,000-300,000 gallons and an equivalent 300,000-500,000 dollars.

5. Evaluation:

a. Very positive feed back from growers attending the demonstrations.

b. Several growers adopted a new practice.

III. 1. Clientele Problem:

See attached Summary Report - 1980 Integrated Pest Management for Blueberries in Maine

IV. 1. Clientele Problem:

Safe and proper use of pesticides require knowledge of their chemical properties and toxicity, methods of application, equipment used for application, caliberation of these equipment among other factors. Blueberry growers, as well as other farmers requested information on safe and proper use of pesticides.

2. Extension Objectives:

Help growers understand the safe use of pesticides needed in their farming operations.

3. Action:

a. Worked with other Extension Specialists, growers representatives from various agricultural commodities and forestry and Maine Farm Bureau to determine how to meet this need.

b. Jointly with the above group prepared a "Pesticide Check List".

c. Conducted training sessions for blueberry growers on safe use of pesticides and provided them with the Pesticide Check List.

4. Results:

a. Thousands of copies of the "Pesticide Check List" were printed.

b. More than two hundred and fifty blueberry growers or potential growers participated in a pesticude use training program which was a part of the 1980 Blueberry School.

5. Evaluation:

Visits with several blueberry growers in summer 1980 revealed that most of them had the "Pesticide Check List" prominently displayed in their pesticide or equipment storage areas. They also showed more awareness of and sensitivity to problems associated with misuse of pesticides and that they practice safe and proper use of pesticides.

V. Other Activities - In Progress

1. Organic (Non-Chemical) Growing of Blueberries:

Several growers indicated interest in receiving information on field management practices for growing lowbush blueberries without use of pesticides.

Results:

a. A survey was conducted in January 1980 to determine farm location, distribution and size and educational needs of organic blueberry growers. Their interest in meeting with the Blueberry Specialist to discuss the results of the survey, location and time of the meeting(s) were also explored.

b. Two meetings for organic growers were held in March 1980 in Ellsworth (12 growers in attendance) and Machias (one grower in attendance).

c. Information on cultural methods for reducing fruit fly population in blueberry fields were presented in the Blueberry Newsletter.

d. Non Chemical methods for weed control were presented and discussed during the 1980 Blueberry School.

e. For information on reducing insecticide use for fruit fly control in Maine's lowbush blueberry fields - see 1980 IPM report.

2. Blueberry/Pesticide Group:

In response to the confrontations and problems that took place during the summer of 1979 concerning the issue of spraying blueberry fields with guthion for fruit fly control, a group of people got together to explore methods to solve the problem. The group is a mixed bag of blueberry growers (chemical and non-chemical users), spray protestants, environmentalists, concerned citizens, Maine Department of Agriculture, Pesticide Control Board, and Research and Extension people from the University of Maine. The Blueberry Specialist has acted as a facilitator for communication and activities of the group.

Results:

a. Established communication links and a productive dialogue between very diversified and at times opposing groups.

b. Specific recommendations relevant to reduction of pesticides use in blueberry production were formulated and communicated to Maine Department of Agriculture, Maine Agricultural Experiment Station, and Maine Cooperative Extension Service.

c. A Public Information program about the use of guthion for fruit fly control in blueberry fields (including: newspaper announcements, radio announcements, contacts with residents abutting to sprayed blueberry fields) was initiated in 1980 by several commercial blueberry growers.

d. Reduced the level of actual and potential confrontation between no spray and spray groups by allowing for direct and organized means of communication.

3. Maine Blueberry Growers Association:

Blueberry growers identified a need to form a growers association to help identify and serve their needs. They requested assistance from the Blueberry Specialist.

Results:

a. Growers meetings were held in Washington County and organizational charters and by-laws of other growers associations in Maine were reviewed.

b. Growers agreed on a name for Association and interim organizational structure.

c. A steering committee of interim officers was elected.

d. A tentative charter and by-laws have been prepared by the steering committee and will be presented for approval of the growers.

e. Approximately forty growers have joined and paid their dues.

3. Wild Blueberry Association of North America:

Blueberry growers and processors in Maine, New Brunswick and Nova Scotia indicated a need to form an organization for North America lowbush blueberry growers and processors to work together to improve the marketing situation of "wild" blueberries.

Results:

a. An exploratory meeting for leaders of blueberry industries and representatives of the departments of agriculture in Maine, New Brunswick, Nova Scotia, Prince Edward Island and Quebec was held in Bangor. The group agreed to form an international organization for lowbush blueberry growers and processors in North America.

b. Area representatives were elected and a steering committee was formed.

c. Proposed Charter and by-laws were prepared and approved.

d. The Association was incorporated in Canada and will be incorporated in the U.S.

e. The majority of lowbush blueberry processors have joined and paid dues on 1980 crop with more than $50,000 collected.

f. A need for conducting a study of the marketing situation (past, present and future and factors affecting it) of wild blueberries in North America and Europe has been identified. Plans are underway to initiate and finance such a study.

g. The first annual meeting of WBANA will be held in April 1981.

PLAN OF WORK - FY 1981 - AMR A. ISMAIL
EXTENSION BLUEBERRY SPECIALIST
(October 1, 1980 - September 30, 1981)

1. Problem:

Although commercial lowbush blueberry production in Maine represents a multi-million dollar industry with economic importance to a large number of blueberry producers, pickers, shippers and packers, production efficiency and returns per acre are relatively low. Growers' survey and input indicate that problems relevant to cultural and field management practices are numerous and range from weed control, fertility management, pruning, using bees for pollination to pesticides application. Research findings indicate the feasibility of significantly increasing yields in most of Maine blueberry fields and reducing the amount of insecticides used if certain cultural practices are adopted. Growers, processors and state government officials have requested that the Extension Service provide an educational program in blueberry production.

2. Objectives:

A. Blueberry growers to adopt a pest management program for the blueberry fruit fly.

B. Blueberry growers will reduce energy use and save in costs of pruning by using more efficient burners and/or flail mowing.

C. Increase blueberry growers knowledge and skill in handling and applying pesticides.

D. Blueberry growers will be able to adopt cultural practices that will increase blueberry yield per acre.

3. Expected Results:

A. Reduction in the amount of pesticides used by blueberry growers while maintaining excellent fruit quality.

B. Blueberry growers will save an estimated amount of 200,000 to 300,000 gallons of fuel oil annually (or 300,000-500,000 dollars). Also, reduce air pollution and increase organic matter content in their fields over the long run.

C. Reduce accidents and misuse of pesticides in blueberry production, less legal problems, and reduce injury to man, blueberry plants and the environment.

D. By adopting latest research findings in the area of weed control, Maine blueberry growers could increase their average production by an estimated 25% or 4 to 5 million pounds with a total return of 3-4 million dollars to Maine's economy (growers, pickers, shippers and packers).

4. Actions to be Taken:

Blueberry School Update, field demonstration plots, Blueberry Newsletter, correspondence, limited farm calls, field days, newspaper articles, radio and TV interviews, and applied studies.

Staff Involved: Amr A. Ismail

Time: 138 days planned (60%)

5. Method of Evaluation:

Questionnaire, interviews, growers participation in activities and their comments, and extent of actual field application of management practices.

6. Applied Studies or Pilot Efforts:

A. Pest Management Program for Blueberry Fruit Fly; cooperate in a project for monitoring fruit fly emergence and formulation of decisions relevant to use or not to use insecticides. Also, evaluation of insecticide application methods and extent of drift.

B. Evaluation and Demonstration of Pruning Equipment; to determine effectiveness of various burning equipment, and flail mowing equipment for pruning lowbush blueberries.