Schenk

John A Schenk

CONE AND SEED INSECT NEWSLETTER[1/]

March 1975

1. General

(Hedlin - B.C., Canada)

Although I was present at the meeting when it was first decided to assemble and distribute the Cone and Seed Insect Newsletter, it isn't correct to say I initiated it. Ron Stark, Thomas Koerber, Kenneth Wright, Leon Pettinger, LeRoy Williamson, Russell Mitchell, Norman Johnson, and I were present at the meeting which took place in Spokane in June 1960 when it was decided to compile a Newsletter. As a matter of interest, I enclose a copy of a report on the meeting, and as you will see from it, Norman Johnson agreed to assemble and distribute the first copies of the Newsletter. Initially, it was done two times per year but this was later reduced to one.

> The consensus of the group was that to prevent duplication in the rapidly growing field of cone and seed insects research, a semi-annual newsletter describing recent findings and other items of interest should be mimeographed and distributed to those working on cone and seed insects in the Western United States. Johnson, as usual, lost a toss and will prepare the newsletter for the first year. Items for the first report are due at the end of July and those for the second report in February.

Several studies which are currently being conducted relate directly to problems in seed orchards.

(a) Cambial mining *Dioryctria* are a chronic problem in graft unions of Douglas-fir seed orchards. Studies are being conducted for information on nature and extent of damage, species involved and control methods. Larvae were collected from cambial mines and reared in the laboratory on a bark medium for information on larval development. There are several species involved. At least one species (*Dioryctria abietivorella*) feeds in both cones and cambial

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[1/] Contributions submitted by cone and seed insect research workers, resource managers, and tree improvement specialists. These unpublished data cannot be used without contributor's approval. Items assembled by G. L. DeBarr, U. S. Forest Service, Athens, Ga.

mines. Adults have been obtained for positive identification on the species involved.

(b) Preliminary studies using light traps (similar to technique of Yates and Merkel) were conducted to ascertain the possibilities of this technique for sampling populations and possible control in seed orchards. Results of these early studies were not promising.

(c) Cones have been collected from a number of different Douglas-fir clones and will be examined for differences in insect infestation.

(d) Seeds from Douglas-fir, spruce, and ponderosa pine are being tested to compare germinability of apparently normal seeds from infested and uninfested cones.

(e) Seeds from Vapona-treated cones and from non-treated cones are being compared for germinability.

(f) Laboratory studies are being conducted to obtain preliminary information on dispersal in litter of overwintering *Hylemya anthracina*, as pest in spruce cones.

(Pierce - California)

Region 5 has initiated discussions to acquire the use of land in the Sacramento Valley to raise superior conifer trees as a seed orchard. The site is a considerable distance from the forest zone. If the orchard is established, it is hoped that the trees will not be contaminated with wild pollen and will remain free of cone and seed insect infestations because of this isolation from the forest environment.

(Goyer - Louisiana)

Mr. Mark Chatelain has initiated a master's program of research at L.S.U. aimed at the biology of the important seed orchard insect pests of loblolly pine in Louisiana. Mark's main study area will be the Beauregard Seed Orchard, DeRidder.

(Wallis - Arkansas)

Mr. Edward V. Gage has left the University of Arkansas after having completed his requirements toward a master's degree in Entomology. Ed's thesis is entitled "Evaluation and Timing of Selected Insecticides for Control of *Dioryctria* Coneworms in a Loblolly Pine Seed Orchard." He is now living at his home in central Washington. Gerald Wallis is continuing the work with seed and cone insects in Arkansas pine orchards.

(Stevens - Colorado)

Study of the cone and seed insect complex in Engelmann spruce is continuing, and we should have some preliminary information to report this time next year.

(Kinzer - New Mexico)

Our research project on seed and cone insects terminated last year. We are still interested in this group of insects, however.

2. Insect Identification and Biology

(Schenk - Idaho)

The following is a partial table of contents of the M.S. thesis of David L. Kuhavy, a former graduate student of mine:

Dr. John W. Dale completed his work at the University of Idaho in 1974. The following is an abstract of his dissertation entitled "Bionomics of the Cone and Seed Insects of Ponderosa Pine in Idaho and Adjacent Washington and Montana."

The cone and seed insects of ponderosa pine, *Pinus ponderosa* var. *ponderosa* Laws., were investigated to anticipate future seed losses in seed orchards and seed-production areas established in the Idaho Tree Improvement Program. Life histories and habits were studied in cases where information was lacking or incomplete.

Seed and cone losses were caused primarily by the following species: *Laspeyresia miscitata* Heinrich, *Laspeyresia piperana* Kearfott), *Conophthorus ponderosae* Hopkins, *Leptoglossus occidentalis* Heidemann, *Dioryctria auranticella* (Grote), *Dioryctria abietella* (D. & S.), *Eucosma ponderosae* Powell, and *Asynapta keeni* (Foote). All species, with the possible exception of *A. keeni*, have the potential for causing serious losses. At $10.00 per pound, the value of seeds lost to cone and seed insects varied from $3.06 to $207.26 per acre.

Laspeyresia miscitata was by far the most ubiquitous species, and together with *L. piperana*, damaged 3% to 73% of the seeds. The larvae feed until entering the cone axis in late July and August. One entrance per larva is made into the axis. The number of holes per axis indicates the number of larvae that once infested vacated cones.

To reduce seed losses caused by *Laspeyresia* spp., future seed orchards and seed-production areas: (1) should not be located in or near stands stocked predominantly with ponderosa pine; (2) should not be located within or adjacent to stands with crown closures greater than 50 to 60%; (3) should be located in mixed stands whose climax type is as remote as possible from ponderosa pine; and (4) should have the trees well spaced. Trees with rapid growth had smaller seed losses and infestation levels than those with slow growth. Preferable sites for the establishment of seed orchards for miminum loss would be those where the spring months have low evaporation rates or high precipitation levels.

Conophthorus ponderosae caused damage at 2 of 13 sites where it destroyed as much as 98% of small cone crops. This beetle will pose a problem in open stands, such as seed-production areas and seed orchards, and is the most serious pest that will face orchard managers.

Distribution of *Laspeyresia* spp. and *C. ponderosae* between trees of dense and sparse crown characteristics indicated that pruning and thinning of the crowns would not have any effect in regulating insect numbers per tree.

Leptoglossus occidentalis occurs throughout Idaho. Damage varies with the stage of seed maturity at the time of attack and resembles seed abortion in many characteristics. This bug damaged 17% of the total seed crop at the site where it was most abundant, and 27% of the seed of cones on which adults and nymphs were observed.

Dioryctria auranticella was localized in occurrence but has a high potential for damage. Damage at Mica, Idaho increased from 1.5 to 57% in two years. Cones with one or two larvae often survive but fail to open and release the physically undamaged seed.

Damage from *Dioryctria abietella* was greatest at sites south of the Salmon River. Heavy scale damage in a cone indicates poor seed viability. Light feeding in scales is not detrimental to seed germination.

Damage from *Eucosma ponderosae* was absent from sites north of the Salmon River. Damage primarily consists of mined scale tissues. However, seed losses ranged from 20 to 35% in 8 of 10 cones with 50% or more of their scales damaged.

Larvae of *Asynapta keeni* occur in darkly stained, pitch-filled pockets and usually are associated with seed or aborted seeds. Damaged seeds often have surface "dimples" carved by the larvae. Total seed losses were 1% or less, and loss in infested cones was 14%.

Factors limiting one or more of the cone and seed insects include parasites and predators, severe winter temperatures, failure of cone crops, interspecific competition, cone response to spring moisture, and vertebrate predators.

(Hedlin - B.C., Canada)

A parasite of *Megastigmus spermotrophus* has been plentiful for several years. It is tentatively identified as *Eurytoma* possibly n. sp.

3. Damage

(Fatzinger - Florida)

During 1973 and 1974, seven studies were installed by members of the "Seed Orchard Insect Sampling Committee" in loblolly, slash, Virginia, and shortleaf pine seed orchards (see following table).

Summary of Studies Installed by the Seed Orchard Insect Sampling Committee

Orchard Description			Sampling Method				
Species	Age	State & Investigator	No. clones	No. ramets/ clone	Type of sample (flower clusters sampled)	Total clusters sampled	Total flowers sampled
Loblolly	12	Tenn.[a/]	10	3	10% Random	188	361
Loblolly		Texas[b/]	8	5	10% Random		
Loblolly	6-7	La.[c/]	5/ac.	4	about 100% (minimum 10 conelets per ramet)		2300
Virginia	8	N.C.[d/]	11	3	10% Random	177	259
Shortleaf	10	Ark.[e/]	10	3	100% (minimum 10 clusters per ramet)	1279	2458
Slash	9-11	Miss.[f/]	5	2	100%	361	531
Slash	17	Fla.[g/]	9	2	20% Random SE upper quadrant 10% Random SE upper quadrant	554 580 282 646	1059 1232 815

a/ Thomas Flavell, Hoover Lambert, Forest Pest Management Group, USFS, Asheville, N.C.

b/ Garland Mason, Texas Forest Service, Lufkin, Texas

c/ Richard Goyer, Louisiana State University, and Louisiana Forestry Commission, Baton Rouge, Louisiana

d/ Thomas Flavell, Hoover Lambert, Forest Pest Management Group, USFS, Asheville, N.C.

e/ Loyd Drake, Neel Overgaard, U.S. Forest Service, Forest Pest Management, Pineville, Louisiana

f/ W. W. Neel, David Jones, Mississippi State University, and W. H. Wharton, Jr., Scott Paper Company

g/ C. W. Fatzinger, Gerard D. Hertel, and E. P. Merkel, U.S. Forest Service, Southeastern Forest Experiment Station, Olustee, Florida.

The committee was formed in 1972 for the purpose of developing standardized sampling methods for measuring the impacts of destructive agents in seed orchards of the five major pine species commonly grown in the Southeast. Basically, the sampling method being evaluated consists of randomly tagging 10 percent of the flower clusters on each of two ramets per clone. The individual flowers of each sample cluster are observed at monthly intervals from the time of flower formation through cone maturity. All causes of injury to each cone are recorded on standard forms throughout cone development.

At cone harvest the seed from each cone are counted, radiographed to obtain seedbug damage estimates, and germinated to estimate seed viability. The results of these studies will be used to produce life tables for the different species of cones and to estimate the impact of various destructive agents on seed yields of the different orchards. These results should also provide basic information needed for developing seed-yield prediction models and for developing sampling methods necessary for evaluating insect control measures in seed orchards.

(Goyer - Louisiana)

A cooperative study of seed and cone losses in loblolly pine (F. S. Alexandria, LA Forestry Commission and L.S.U. cooperating) was completed in October 1974. In line with earlier Newsletter reports, losses were high, especially during the first year of conelet development. Total losses by all causes were 83.5% over the 2-year study. Of this loss, 75% was caused by insects. *Dioryctria* spp. accounted for 57% of the total loss followed by "undetermined insects" with 13%. Other causal agents were of minor importance. Numerous cones were observed being attacked by the seedbug *Tetyra bipunctata*. Analyses of data indicate a difference in attack levels among the 14 clones sampled with a range of loss from 68.2% to 96.4% per clone.

(Meso - Oregon)

The western seedbug, *Leptoglossus occidentalis*, is exerting an increasing impact at our Dorena Seed Orchard near Cottage Grove, Oregon. This facility produces blister rust-resistant western white pine seed and reforestation stock for 25 different seed zones in Oregon and Washington. Seedbug population levels in the orchard depend on cone availability in Douglas-fir stands adjacent to the orchard's perimeter. In 1974 the only cones produced were those in the orchard, and these cones attracted numerous adults. Orchard practice includes bagging each second-year cone in early spring to catch and retain any released seeds until the cones are harvested

later that summer. Cone bagging has effectively deterred western seedbug damage. A field evaluation is planned for 1975 to determine the effectiveness of different bagging methods.

(Torgersen and Harris - Alaska)

Cones of Sitka spruce were collected on the Valley Sale Area at Raspberry Strait, Afognak Island in the fall of 1973. The samples were taken from branches of several mature trees recently felled during the logging operation. The cones were shipped to the Forestry Sciences Laboratory at Juneau, where the seed tests were conducted.

After air drying at room temperature for about 10 days, seed was extracted using a mechanical cone shaker, dewinged and cleaned. Before conducting the cutting tests, subsample weights were obtained and a seed count made. The results appearing below represent figures for subsamples representing a total sample containing 5886 seeds. Seed condition was determined by cutting tests run on two subsamples totaling 565 seeds or about 1 percent of the total. The table shows results of the cutting tests.

	Sample			
Seed Class	A	B	Total	Percent
Apparently viable	9	46	55	9.7
Dried, empty	44	137	181	32.0
Dried kernel	45	100	145	25.7
Insect damaged	38	146	184	32.6
			565	

Insect damaged seed was attributable to the activity of lepidopterous larvae determined to be *Laspeyresia youngana* (Kearf.). Since there is some concern that there will be adequate restocking after cutting, it would be advisable for research and/or the RMA to keep abreast of seed condition in critical areas.

(DeBarr - Georgia)

A cooperative agreement with the Eastern Tree Seed Laboratory (State and Private Forestry) was renewed for a second year, and the summary of the three years of the Seed Orchard Survey was completed. The data include (a) cone yields and cone insect damage from field observations; (b) seed viability, seed yield and seedbug damage from laboratory analysis; and (c) efficiency in terms of tree potentials. This survey provided comprehensive data on the impact of cone and seed insects in 27 seed orchards in the South.

In 1973 two studies were initiated to determine the impact of seedbugs in operational loblolly and slash pine seed orchards. The loblolly pine study was installed in 14 untreated orchards of the North Carolina Tree Improvement Cooperative. Small screen wire cages were used to protect second-year cone clusters from seedbugs on 168 ramets representing 78 clones. Seedbug-damaged seed observable on radiographs of uncaged samples from the same ramets averaged 11 seed/cone for the 14 orchards and ranged from a low of 1 damaged seed/cone to a high of 28 damaged seed/cone. Overall, the caged cones from the 14 orchards produced an average of 6 more seed/cone and 15 more filled seed/cone. Less than 1 seed/cone was classified as "seedbug damaged" on the radiographs of samples from the caged cone clusters. The slash pine study was installed on 42 clones in 7 Florida Cooperative orchards. The results of this study are not complete.

The impact of seedbugs on control pollinated slash pine cones was studied in cooperation with project SE-1502. The seed yields from self-, polycross-, and wind-pollinated cones were compared with and without screen wire cages. Screen wire cages greatly increased seed yields from all pollination methods. With cages, the wind-pollinated cones produced an average of 116 filled seed per cone compared to 20 filled seed from the uncaged cones.

4. Control

(Meso - Oregon)

Because we have no progressive concept, such as the Southern Seed Orchard Pest Committee coordinate pesticide testing, dimethoate is still the only chemical registered for Douglas-fir cone and seed insect control at a one-half percent dosage rate applied as a hydraulic spray. Some of our past control projects found that this dosage rate produced nonsignificant results. The D. T. Mason Seed Orchard, operated by the Timber Service Company, Sweet Home, Oregon, is in production, and in 1974 the only cones in the area were located in the seed orchard. To minimize insect impact and to insure seed supplies for their reforestation needs, Timber Service Company made the decision to use dimethoate but at a one percent rate. In both Oregon and Washington, a private applicator can deviate from the label registration if the chemical is confined only to their own lands and they assume any risks. One application of one percent dimethoate was applied with the following results:

	Percent Seed Loss	
	Treated	Untreated
Midges	1.8	21.9
Moths	0.1	23.0
Chalcid	1.9	9.0

Usable seed yield for the treated cones amounted to 36 percent, in contrast to the untreated cones which produced 19 percent unaffected seeds. Dimethoate is phytotoxic to the older tree foliage. Degree of phytotoxicity is related to weather conditions and dosage rate. Trees that exhibited the greatest needle damage in early spring began showing subtle graft incompatibility signs later during the summer.

(Hedlin - B.C., Canada)

Dacron net bags were placed over cone-bearing Douglas-fir twigs on which cones were infested with *Barbara colfaxiana* eggs. Sections of Vapona strip were placed in some bags to determine their effectiveness in preventing insect damage following oviposition.

(Cade - Washington)

A small scale (10 tree) insecticide screening trial was carried out against the Douglas-fir coneworm *Dioryctria* spp. in the McDonald Seed Orchard near Chehalis, Washington. Insecticides were applied once only as 0.75% active sprays to 25 cones per tree in mid-June. Evaluation as follows is based on percent of cones infested:

Insecticides	Percent cones infested
Azodrin	5.4
Monitor	8.6
Dimethoate	10.0
Orthene	10.2
UC-49035	13.2
Methomyl	14.7
TH 6040	17.4
Untreated	21.3

(DeBarr - Georgia)

In 1974 our project assisted the Southern Seed Orchard Pest Committee in conducting Southwide tests of carbofuran in 12 seed orchards. The results showed similar trends in all test orchards. *Dioryctria* spp. control ranged from good to excellent. Single soil applications were more effective than spreading the same amount of insecticide over 2 or 3 applications. *Eucosma* control on Virginia pine was outstanding. Preliminary appraisal of the radiographic data indicated that carbofuran was also very effective in reducing seedbug damage. Treated trees from several of the seed orchards yielded 2 to 5 times more full seed per cone as unprotected cones.

(Goyer - Louisiana)

Furadan and Thimet 10% granulars applied by a Gandy spreader effectively reduced conelet losses to loblolly pine. Treatments were applied February 1 (4 oz. of formulation per inch DBH) (1X), March 1 and April 9 (total of 8 oz. per inch DBH) (2X) and (for Furadan only) March 1, April 9, and May 29 (total 12 oz. per inch DBH) (3X). Trees averaged 4 inches DBH. Treatments consisted of 1 acre blocks replicated 4 times per treatment. Five clones per block were chosen for evaluation. On each tree (clone) 10-23 conelets were tagged at time of flowering in March 1974 and evaluations conducted monthly. As of October 1974, the results were as follows. (Totals of 4 reps given here to conserve space.)

% Loss

Untreated Check	Furadan			Thimet	
	1X	2X	3X	1X	2X
18.4	4.4	6.0	7.4	6.4	10.8

This study will be continued in 1975 until cone maturity.

(Wallis - Arkansas)

Furadan, applied to the soil under the drip-line of loblolly pine trees, gave erratic control. Three levels of material were applied: (1) all on March 21; (2) ½ dose each on March 21 and May 29; and (3) 1/3 dose each on March 21, May 29, and June 25, to 6 different clones. Seventy-two trees were involved in the test. The only statistically significant difference was the percent of *Dioryctria* damage between clonal types within the orchard.

(Gage - Arkansas)

Eight insecticides were evaluated on loblolly pine for control of *Dioryctria*. Materials were applied with respect to adult activity in the area. Five foliar sprays were applied approximately during peak adult emergence and 3 granular systemics were sprinkled under the trees approximately 1-2 months prior to expected adult activity. Of the foliar sprays, Guthion 0.5, 1, 2 lb ai/100 gal; Zectran 1, 4 lb ai/100 gal; and Dipel 1, 4 lb ai/100 gal appeared to be the most effective, while Imidan 0.5, 1, 2 lb ai/100 gal and Gardona 1, 2, 4 lb ai/100 gal showed less reduction of damaged cones. The only material showing any visible degree of phytotoxicity was Zectran 1, 2, 4 lb ai/100 gal. Results of Dipel indicated the method

of timing was fairly accurate. Baygon 0.2 oz ai/in DBH and Furadan 0.2 and 0.4 oz ai/in DBH appeared to be the better systemic treatments. Temik 0.2 and 0.4 oz ai/in DBH showed no reduction in cone damage.

(Neel and Jones - Mississippi)

This is a summary of the 1974 carbofuran study for control of *Dioryctria* spp. on slash pine at the Scott Paper Company Seed Orchard in Greene County, Mississippi. The experiment was conducted in the northeast annex (approximately seven acres) of the orchard and was not sprayed for insect control as was the rest of the orchard. Trees averaged 25 feet in height and 5-6 inches DBH. The trees are located on points 30 feet apart and rows 30 feet apart. The soil is sandy and the ground cover is mainly bahia grass.

Carbofuran 10% granular was applied on 7 April and 6 June, using 5 different treatments: control - no insecticide applied; band - 4 oz./inch DBH; broadcast (1) - 4 oz./inch DBH; broadcast (2) - 8 oz./inch DBH; drill - 4 oz./inch DBH. The experimental design used was a randomized complete block design. Five clones were used with 1 ramet/clone in each treatment (5 trees/treatment).

At the time of application the vegetation under all trees was mowed in order to reduce the uptake of the insecticide by the ground cover. Banding consisted of incorporating the carbofuran into the soil with a fire rake in an 8-10 inch band along the drip-line of the tree. In broadcasting, the granules were applied to the soil surface within the tree-crown projection and no attempt was made to incorporate the granules into the soil. Drilling consisted of digging six shallow holes about 1 inch deep, evenly spaced, around the drip-line. Carbofuran was poured into the holes and covered with soil.

All conelets and cones were tagged in March on each tree and checked monthly from April through September.

The results are as follows:

	% Damaged Conelets		% Damaged Cones	
	Dioryctria	Other/Unknown	*Dioryctria*	Other/Unknown
Control	13.8	18.7	24.9	1.0
Band	2.3	1.7	15.3	2.1
Broadcast (1)	0.5	1.4	6.9	1.7
Broadcast (2)	0.7	1.1	0	0
Drill	0.6	2.6	2.1	0.7

(Hertel and Merkel - Florida)

Many seed orchardists in the South are concerned about protecting first-year, grafted, outplanted pines from pine tipmoth attack. In 1973 a small experiment was conducted in a seed orchard in Hamilton Co., Florida to evaluate the effectiveness of Furadan 10% granular (carbofuran) for tipmoth control. The Furadan was applied to first-year, grafted outplants of slash and loblolly pine on 10 July 1973, the date of planting. Furadan granules was also applied to two-year-old grafted sand pine. All three pine species received dosage rates of 10, 20, 30, and 40 grams of Furadan 10G per tree, applied in a narrow band around the tree base on the soil surface about 4 inches from the tree and then lightly covered with soil by means of a hoe. In addition, 10 and 20 grams of Furadan 10G was placed in the bottom of the planting hole just prior to planting of some slash pine only. Twenty trees were used for each treatment and an equal number of untreated trees was used for each pine species. As of 30 November 1973, all treatments showed virtually complete control of tipmoths, pine webworm, and spider mites. Needle-tip burn and yellowing of foliage was most prevalent at the two highest dosage rates but these symptoms occurred more irratically at lower dosages. No tree mortality occurred.

Another test was established in a slash pine plantation in Taylor Co., Florida that was planted in December 1972. Furadan 10G was hoed into the soil around the bases of the trees on 16 May 1973 at 0-, 5-, 10-, and 40-gram per tree rates. As of November 1973, all Furadan-treated trees were completely free of tipmoth attack whereas 39% of the check trees were infested. Needle-tip burn was prevalent at the 40-gram rate.

Since Furadan 10G is currently registered for use to control the pales and pitch-eating weevils in pine plantations, we encourage entomologists to obtain tipmoth efficacy data and phytotoxicity data with the purpose of obtaining registration of Furadan 10G at the earliest possible date.

Even though tests with Furadan soil applications for cone and seed insect control look encouraging in the South, many more carefully planned and conducted field experiments are needed before we seek registration for this chemical.

(Merkel - Florida)

I refer readers to pages 5-6 of the April 1974 Newsletter where I described results of a small field experiment to control *Dioryctria* spp. with Furadan® 10% granules in a slash pine seed orchard. In February 1974, 10 months after the last Furadan

application in this same study, I made a tally of sound, thrips-killed, and thrips-damaged female strobili on 100 strobili per study tree. An average of 28% of the female flowers were thrips-killed on untreated trees whereas only 14% were killed on Furadan-treated trees. In addition, thrips-damaged flowers averaged 33% less on treated than on untreated trees. Differences in thrips-caused flower mortality and damage, between treated and untreated trees, were statistically significant at the 5% probability level.

The encouraging results of the February 1974 flower mortality/damage evaluation led me to assess *Dioryctria* infestation on second-year cones at cone harvest in September 1974. Coneworm attacks were very light overall but untreated trees sustained an average of 3.4% maturing cones per tree whereas cone attacks on 1973-treated trees averaged 0.9%. This difference was statistically significant at the 1% probability level.

Encouraged by the above results, I installed another field experiment in this same slash pine seed orchard in 1974. Furadan 10% granular was applied to the soil surface and lightly disced into the sod. A single application was made on 11 April 1974 at three dosage rates, i.e., 0, 10, and 20 ounces of the 10% granules per inch of tree d.b.h. Each dosage rate was applied to 27 trees in a completely randomized design. Based only on a tally of *Dioryctria*-attacked cones harvested with a tree-shaker machine in September 1974, no significant reduction in coneworm attacks was obtained with either Furadan application. The fact that overall *Dioryctria* infestation of second-year cones averaged less than 5% in all treatments in 1974, and that tree shakers do not consistently harvest 100% of either sound or insect-attacked cones, may have contributed to the complete lack of insect control obtained in this experiment.

(DeBarr - Georgia)

Guthion is currently the only insecticide registered for cone and seed insect control in older seed orchards, and the label is restricted to slash pine. Data from 4 new tests were submitted in February 1975 to support the request for an extension of the Guthion registration. Data from earlier tests by Merkel and I on longleaf pine, as well as cooperative tests conducted from 1971-1973 in two slash pine orchards, were also included. Hopefully, this efficacy data will be sufficient to extend the Guthion registration to include coneworm, seedworm, and seedbug control on "southern pines."

5. Publications

(Hedlin - B.C., Canada)

The North American Forestry Commission, FAO, will sponsor a publication on Cone and Seed Insects of North America. I have agreed to act as Chairman of a group to carry out this piece of work. This is still in very early stages of development, so it is premature to say much more than that it will comprise an illustrated comprehensive publication on cone- and seed-destroying insects in Mexico, U. S., and Canada. A number of people will have opportunity for input in one way or another.

(Yates - Georgia)

In preparation by the Southeastern Forest Experiment Station and State and Private Forestry, Southeastern Area is a pictorial guide to Southern Pine Seed and Cone Insects. This guide describes insects which limit seed production of the pine species native to the Southern United States and is intended for use by foresters and tree improvement workers. All illustrations will be in color. Also included will be easily used keys to damage and coneboring caterpillars, insect-host pine tables, insect distribution maps, and damage period tables. Joint authorship includes B. H. Ebel, T. H. Flavell, L. E. Drake, H. O. Yates III, and G. L. DeBarr.

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