Kentucky FARM AND HOME Science

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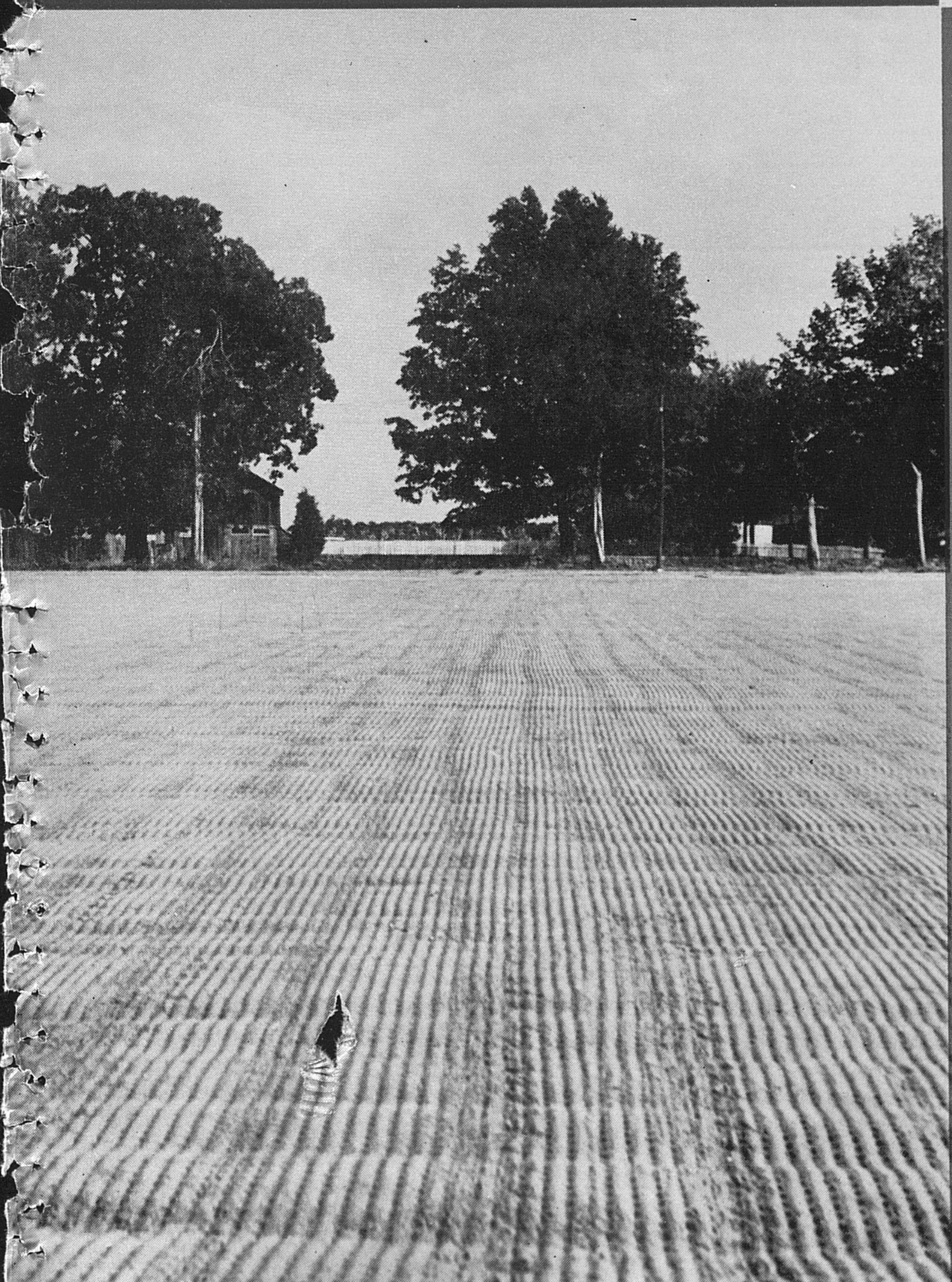

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Kentucky FARM AND HOME Science

(CORRECTION—The Summer 1957 issue of Kentucky Farm and Home Science was incorrectly designated as "Vol. 2, No. 3." The correct designation is Vol. 3, No. 3.)

Volume 3, Number 4 . . . . Fall 1957

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In This Issue

The Cover

This photograph of a pasture fertilization experiment in Simpson county was made immediately after seeding in September 1955. The photographer was Dr. E. C. Doll, of the Agronomy department. The field is located on the farm of Mr. Paul Holloway. Some of the results obtained in 1956 were discussed in the winter 1957 issue of Kentucky Farm and Home Science, in an article by Dr. Doll entitled "The Importance of Proper Fertilization Is Shown in Western Kentucky Pasture Trials." Field experiments are being conducted by the Agronomy Department at more than 60 different locations throughout Kentucky, on soils representing the major types found in the state.

How Long Can Processed Milk Be Kept?

Preliminary results show flavor to be satisfactory after various periods of storage times and temperatures; economies are indicated

By W. E. GLENN and T. R. FREEMAN

Before World War II most commercial milk processing plants made home deliveries every day. During the war it became necessary to conserve manpower, gasoline, and rubber by delivering to the homes every other day. With greatly improved plant sanitation and refrigeration, coupled with the high cost of labor and the strong drive for economy now underway, some dairies are now considering twice-a-week deliveries. As an outgrowth of this economy drive the University of Kentucky Dairy Department has undertaken a study to determine just how long commercially pasteurized milk will keep with an acceptable flavor at various refrigeration temperatures.

Purpose of Study

This study is designed to determine (1) the relationship of the bacterial flora of the raw milk at the time of pasteurizing to the initial flavor score of the pasteurized product; (2) the relationship of the three general types of bacteria (*mesophil's*—usual types found in pasteurized milk; *coliforms*—of intesinal origin; and *psychrophiles*—cold-loving organisms) to the shelf life of milk stored at 35°, 41°, and 50°F; and (3) the relationship of the storage temperature to the shelf life of the milk. A sample of the raw milk and several sealed ½-pint containers of this same lot of milk after processing are obtained at 2-week intervals from all the dairy processing plants supplying the city of Lexington, Kentucky. The raw sample and one of the pasteurized samples are analyzed bacteriologically. Samples of the pasteurized milk are stored at each of the refrigeration temperatures, 35°, 41°, and 50°F. A sample from each storage temperature is withdrawn every 5 days for flavor and bacteriological analysis.

The results after 6 months of study indicate that:

(1) The bacterial flora of the raw milk may affect the initial flavor score of the freshly processed milk. Once the quality of the milk has been impaired by bacterial action there is as yet no known procedure for restoring its original quality. The bacterial count of the raw milk largely determines the initial bacterial count of the pasteurized milk. Apparently the number of bacteria generally found in milk increases very slowly in milk stored at 35°F, somewhat faster in milk stored at 41°F, and considerably faster in milk stored at 50°F.

(2) As previously indicated, the usual bacteria found in pasteurized milk increase very slowly at 35°F, usually requiring 5 to 10 days before a significant increase occurs. As the refrigeration temperature is increased these bacteria grow faster. Coliforms grow extremely slowly if at all at 35°F. They may or may not grow at 41°F, depending on the strain involved. There is generally a considerable increase in the coliform count during 5 days' incubation at 50°F. The psychrophiles increase slowly in the milk stored at 35°F, faster at 41°, and considerably faster at 50°F. Preliminary results indicate that 500,000 to a few millions of organisms per ml. of milk are required before the milk acquires an objectionable flavor.

(3) Certainly these preliminary results forcefully show the necessity of storing milk at low refrigeration temperatures for long shelf life.

Preliminary Conclusions

Results of this study indicate that properly processed milk will have a low bacterial count and be free of coliforms and virtually free of psychrophiles. Such milk when stored at 50°F may be expected to have a satisfactory flavor after 6 days of storage; at 41°F about 16 days; and at 35°F about 26 or more days.

If further study supports these findings, it would indicate the possibility of important economies in distribution and use of milk in the home. There are now commercially available table refrigerators holding two

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LONG-TERM WORK SHOWS DIFFICULTIES IN INTERPRETING

Virus Symptoms In Legumes

Several different viruses can cause mosaic in red clover; also a wide range of symptoms can be induced by inoculation with a single culture

By STEPHEN DIACHUN and LAWRENCE HENSON

Red clover plants with symptoms of virus infection are common in Kentucky, as well as in other clover-growing areas of the United States. The appearance of infected plants is variable. Most commonly diseased plants show either yellowing of veins or yellow speckling of the leaflets; the latter is called mosaic or mottle. Mosaic may be mild in some plants, moderate in others, and severe in still others. In a relatively few plants veins and petioles become dead and black, and leaflets become twisted. In some cases the dying or necrosis spreads into the buds, and eventually the entire plant dies. A high percentage of plants showing symptoms is found in some fields.

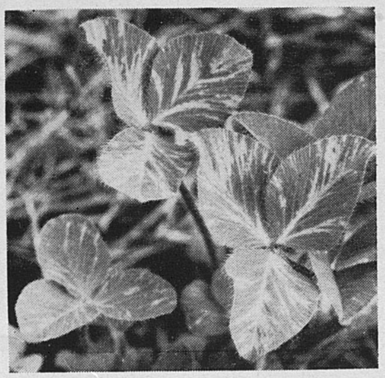

Fig. 1a.

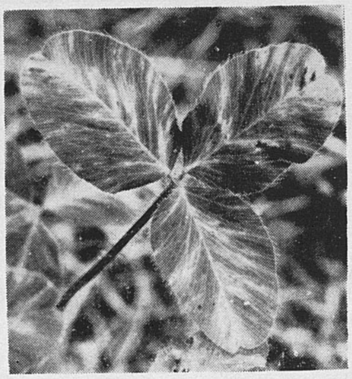

Fig. 1b.

These figures show symptoms of the yellow bean mosaic in red clover.

Purpose of Experiments

In July 1952 experiments, which are continuing, were started by the Kentucky Agricultural Experiment Station to determine what virus or viruses cause the symptoms in red clover; and also to determine whether the wide range of symptoms present in clover fields is caused by a mixture of viruses, or by strains of one virus, or by different reactions to a single virus of plants in a genetically variable population that make up a variety of red clover.

The purpose of this article is to emphasize the difficulties involved in identifying virus diseases of forage legumes and to report the results of some of the work being done with red clover viruses at the Kentucky Station.

It is almost impossible to identify virus diseases of red clover on the basis of field symptoms alone because symptoms caused by a number of viruses may be very similar. Several viruses can cause mosaic in red clover; among them are the pea mosaic virus, yellow bean mosaic virus, alfalfa mosaic virus, red clover vein mosaic virus, pea streak virus, potato yellow dwarf virus, and cucumber mosaic virus. Even with the use of laboratory facilities it is difficult to identify these viruses because viruses themselves are so tiny that they cannot be seen with the highest powers of the ordinary light microscope, and are identified only indirectly on the basis of their properties and behavior. Partly because of these difficulties, sufficient attention has not been given to a study of virus diseases of red clover anywhere; consequently, specific detailed information about virus diseases of red clover is not available. For that matter there is not yet general agreement among plant pathologists as to what the most common virus in red clover actually is.

To identify viruses accurately it is necessary to know something about the host range, kinds of symptoms, method of spread, and some of the physical properties. To get such information inoculations were made from more than a hundred representative naturally infected plants to several hosts, including beans, peas, tobacco, crimson clover, and red clover. On the basis of host range, symptoms, method of transmission, and the presence of characteristic crystalline bodies inside nuclei of some infected cells, it was concluded that the virus isolated most commonly from naturally infected red clover is yellow bean mosaic. For instance in one series of isolations this virus was recovered from 113 of 136 naturally infected red clover plants showing virus symptoms. In the same test yellow bean mosaic virus was also recovered from 32 of 35 naturally infected sweet clover plants, and from 25 of 31 crimson clover plants.

Several Hundred Seedlings Inoculated

After it was found that yellow bean mosaic virus is commonly present in naturally infected plants it seemed desirable to find out whether this virus would cause similar symptoms in inoculated plants. Accordingly, several hundred red clover seedlings were inoculated by rubbing leaves with a typical strain of yellow bean mosaic virus that had been recovered from red clover. As these inoculated plants became infected it was obvious that the range of symptoms was similar to the symptoms present in fields of naturally infected red clover plants. But it was not yet clear whether such different symptoms produced by inoculation with one field isolate of yellow bean mosaic virus resulted from the presence of a mixture of strains of virus, or from the presence of differently reacting plants within a population of a variety of red clover plants. Red clover is cross pollinated, and individual plants are known to differ among themselves with respect to susceptibility to some diseases, as well as in appearance. It was felt that inoculation of clonally propagated plants might help to resolve this problem. Therefore, cuttings were made from selected healthy plants of Kenland red clover; then several plants of each clone were inoculated with one strain of the virus. The results were quite striking: symptoms on all plants of any one clone were the same, but symptoms on different clones were different. Of 126 clones tested, 8 failed to develop symptoms; 95 showed either vein yellowing or mosaic, some mild, some severe, and some intermediate; 10 showed both vein yellowing and death of veins; and 13 were actually killed. Symptoms on selected representative clones are shown in the photographs.

The results of these tests show quite clearly that in Kentucky yellow bean mosaic virus is the cause of much of the virus infection on red clover, and that a wide range of symptoms such as occurs in naturally infected red clover plants can be induced in a population of plants, within a variety, by inoculation with one culture of yellow bean mosaic virus.

The fact that such different symptoms, ranging from mild mottle to death of plants, can be produced by

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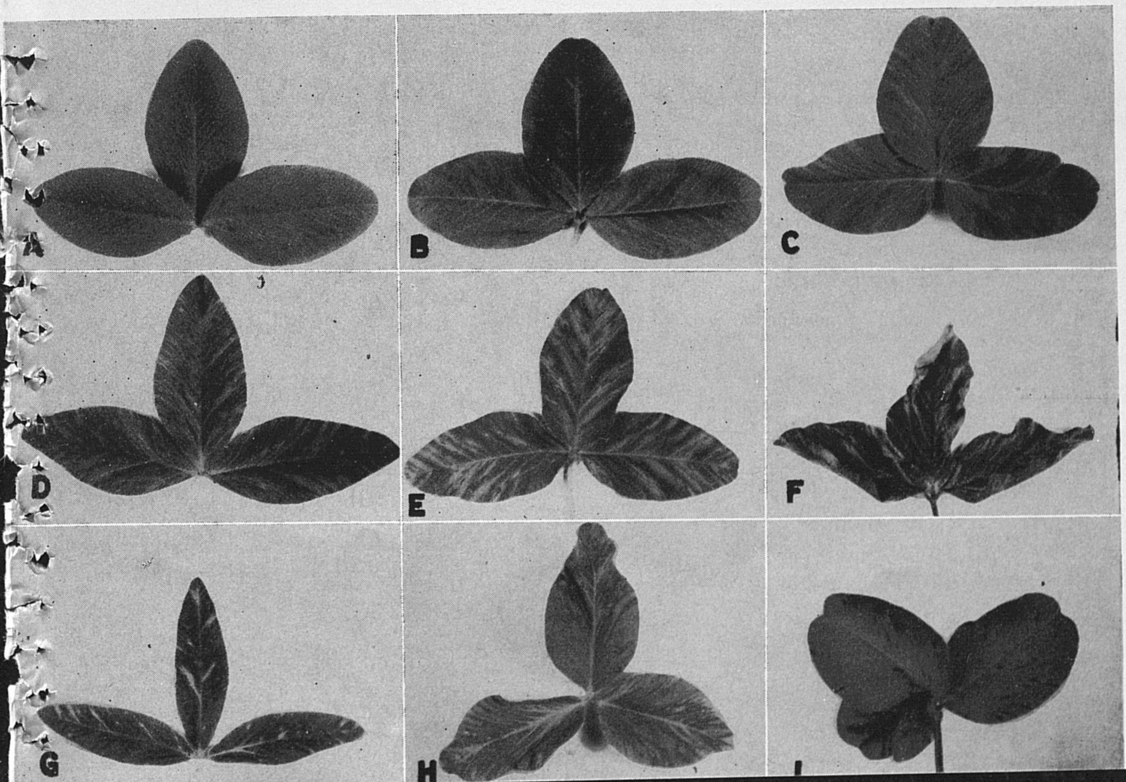

Fig. 2.— A healthy leaf is shown in A. The range of symptoms produced by inoculating different individual plants of red clover with the same culture of yellow bean mosaic virus is shown in B through I.

(Plate courtesy Phytopathology)

Fig. 1.—This shows a portion of the Eden Shale Farm on which Scotch pine have been planted. Weeds and grass obscure the trees. Dalapon applied on the plot to the left of the white stake had a marked effect on the growth of fall asters, compared with the check plot on the right.

Various chemical treatments tested at U-K's Eden Shale Farm to find most effective and safest method to effect

Christmas Tree Weed-Grass Control

By O. M. DAVENPORT and J. W. HERRON

Control of grasses and weeds in Christmas tree plantations on the Eden Soil Series may be a major factor in both survival and quality of the planting. Limited experience of the Kentucky Agricultural Experiment Station's work in Christmas tree culture in this area indicates that plantings made in old pasture areas with some sod cover are overtopped in mid-June by grasses and various weeds. By late August the weeds (chicory, ragweed, bergamot, and others) are waist high. During the second year these conditions often cause a heavy tree mortality as well as a suppression of the lower branch whorls on the trees. This directly affects future tree quality.

Limited control work was carried out in a two-year planting of Scotch pine on July 17, 1957, with dalapon, amino triazole, mineral spirits fortified with pentachlorophenol, and maleic hydrazide. The dalapon was applied on three strips each 20 x 300 feet by boom spraying equipment at rates of 5, 10, and 20 pounds per acre. It was also applied by gun spray on four plots, each 25 x 50 feet, at rates of 5, 10, 15 and 20 pounds per acre. Five gallons of solution was sprayed on each plot as uniformly as possible.

The amino triazole was likewise applied in 5-gallon solution lots on three plots of the same size at rates of 2, 4, and 8 pounds per acre. Maleic hydrazide was used in simliar fashion with a 5-gallon solution quantity application at 4 ounces and 8 ouces of MH 30 per plot concentration.

Two-and-a-half gallons of mineral spirits fortified with 3 ounces of pentachlorophenol were applied to the last plot.

After 8 days, considerable browning of the grasses and some broad-leaved weeds was apparent on all strips and most of the plots. The plot sprayed with

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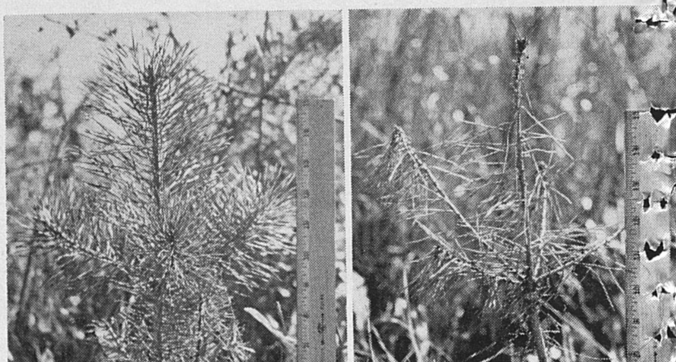

Fig. 2.—(left) Scotch pine showing little or no injury from a 5-pound-per-acre application of dalapon; (right) Scotch pine showing serious injury from a 20-pound-per-acre application of dalapon.

Value of Soil Insecticides When Transplanting Tomatoes Questionable

Dipping was definitely detrimental; granular method was only one to show any promise

By J. G. RODRIGUEZ and E. M. EMMERT

As the use of soil insecticides increased, it was perhaps a natural development to attempt to add them to the water used in the transplanting of certain plants. Considerable interest was shown by Kentucky farmers in the use of insecticides in tobacco transplanting solutions, but research proved the current formulations used to be harmful to plants.

Although the soil pests attacking tomatoes appear to be few, root damage by such general root feeders as flea beetle larvae or the garden symphylid is a possibility. Accordingly, it seemed advisable to investigate the use of soil insecticides in transplanting tomatoes.

The experiments continued during two seasons and were conducted when potted tomato plants were transplanted to the field. In 1955 treatments were applied in two ways—as transplanting solutions (½ pint per plant) and as dips (the soil core which was knocked loose from the pot was dipped into the solution for about 2 seconds). Aldrin, dieldrin and heptachlor at 0.5 pound per 100 gallons for dip solutions and 0.5 pound per acre for transplanting solutions, and lindane at 0.25 pound in both types of solution were used in comparison with water (the check).

Varieties Used in 1955

Varieties used in 1955 were Garden State and Valiant. Tomato yields were evaluated according to early and late harvest as well as for total yield for each variety.

The general effect of all types of treatments made that year was undesirable. Plant injury was noticeable. Yields of plants given the dip treatments, even those of the water checks, were considerably lower than the yields from the corresponding transplanting solution treatments. This may be accounted for by the fact that the dipping process crumbled the soil core around the plant roots and the dipped plants did not start growth as readily as the others. However, none of the insecticide-treated plots in either type of treatment yielded as many tomatoes as did the corresponding water check plants.

Dip treatments were discontinued the following season, and a test with granular insecticides was substituted. The granules were placed in a band along the sides of a furrow 4 or 5 inches deep into which the plants were set. The insecticides used, expressed in pounds per acre actual material, were as follows: in the transplanting solutions, wettable powders of aldrin, 0.25 and 0.5; dieldrin, 0.125 and 0.25; thimet, 0.5 and 1.0; heptachlor, 0.25 and 0.5; in the granular form, aldrin, 2%, 0.5 and 1.0; dieldrin, 1%, 0.25 and 0.5; thimet, 4%, 1.2 and 2.4; heptachlor, 2½%, 0.5 and 1.0. A water check again was used with the transplanting solutions and an untreated check with the granulated formulations. One-half pint of water was used to transplant each tomato plant which was treated with the granulated formulation.

Different Varieties in 1956

Varieties used in 1956 were Early Giant and Rutgers. Very little plant injury was noted in any of the treatments, showing a seasonal difference in the response of the plant to the transplanting solutions during 1955 and 1956. There was the possibility that changing insect populations in the root zone, as well as such factors as rainfall or temperature, may have caused this seasonal difference.

Effects of treatments on yields in 1956 were erratic. Plants given the transplanting solutions in some cases showed slight increases over the check. Analysis showed these increases, however, to be not significant. Granular applications of thimet at both levels applied, of dieldrin at 1.0 pound per acre and heptachlor at 1.0 pound per acre, increased yields significantly over the check. Other granular treatments showed slight increases.

It may be concluded, therefore, that the use of soil insecticides when transplanting tomatoes may not be beneficial, and, in fact, is often detrimental. The dipping process as used in 1955 was definitely detrimental; apparently some benefit may be gained from some insecticides in transplanting solutions during certain seasons, and in this series of tests, the addition of granular insecticides proved to be the most promising practice of the three methods tested.

Virus Symptoms in Legumes

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one virus emphasizes the difficulty if not impossibility of identifying virus diseases of red clover on the basis of field symptoms alone without the help of laboratory tests.

Also, the presence of such diverse genetic reactions to the virus suggests the possibility of breeding virus-resistant lines of red clover based on clones selected for resistance.

How Long Can Milk Be Kept?

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3-gallon metal cans for automatic milk dispensing in the home. If the demand arises, no doubt smaller capacity units would be offered to the consumer. Since these refrigerators maintain the milk at 35°F, frequency of delivery could be greatly reduced. The re-usable metal containers could reduce the packaging cost of milk considerably which, together with one stop per week for the delivery man instead of the present three stops, would make milk distribution and handling more profitable, reduce the retail price to the consumer, or both.

Weed and Grass Control

(Continued from Page 6)

mineral spirits and penta chlorophenal showed an almost complete browning of all vegetation and some tree yellowing. As this spray was essentially a contact material, such early effects were expected.

On September 10, 24 days after the applications, a further study was made and the following observations recorded:

A. DALAPON TREATMENTS

Strip 1 (5 lb/acre rate) Boom spray. Minor yellowing of a limited number of Scotch pine needles. Fair to good grass control. Little or no effect on most weeds.

Strip 2 (10 lb/acre rate). Boom spray. Serious tree damage, with more than half of the trees completely browned and the rest in varying degrees. Good grass control. Some effective browning of weeds.

Strip 3 (20 lb/acre rate). Boom spray. Almost total tree kill. Almost complete grass control. Fair to good weed control.

Plot 1 (5 lb/acre rate) Gun spray. Some tree damage, with scattered trees showing complete browning of needles. This variant from strip 1 may be explained as resulting from the difference in spray application. Fair-to-good grass control. Poor weed control.

Plots 2, 3 and 4 all showed serious tree damage with good grass control and increasing degrees of weed control.

B. AMINO TRIAZOLE TREATMENTS

Plot 1 (2 lb/acre rate). No apparent tree damage. Medium grass control. Slight weed control.

Plot 2 (4 lb/acre rate). No apparent tree damage. Good grass control. Slight-to-medium weed control.

Plot 3 (8 lb/acre rate). Marked chlorosis of tree needles. Good grass control. Medium weed control.

C. MINERAL SPIRITS PLUS PENTA TREATMENT

Spotty tree damage. Poor lasting grass control. Medium-to-good weed control.

D. MALEIC HYDRAZIDE TREATMENTS (MH 30)

Plot 1 (4 oz/5 gallons of water). No apparent effect on trees, grasses or weeds.

Plot 2 (8 oz/5 gallons of water. No apparent effect on trees, grasses or weeds.

General Comment

The results so far obtained from this work illustrate the difficulty encountered in attempting to control weeds and grass in Christmas tree plantings by chemicals. Of the materials tested, only the amino triazole at the lower concentration used seemed safe for use on the 2-year-old Scotch pine plantings. None of the materials as used gave satisfactory weed control, except at concentrations that caused tree injury.

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