MODERATOR NELSON. Is there any discussion anyone wishes to volunteer on this paper? If not, I will now call on Dr. James Kamp to present Dr Ticknors' talk entitled, "Chemical Weed Control in Nursery Beds"

DR JAMES R. KAMP (Urbana, Illinois): We are going to save some time on this paper, too, as far as questions are concerned. There is no use asking me any questions about this because I am only going to read what Dr. Ticknor has written down here. I have never seen his work, nor have I ever done any work like this

Dr. Kamp then read the prepared paper (Applause)

CHEMICAL WEED CONTROL IN NURSERY BEDS

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One of the most expensive weed control jobs in the nursery is in beds where plants are grown until large enough to be planted in the field. Close spacing and the small size of the plants necessitate the use of hand labor for this job.

A number of products have come on the market in recent years to meet this problem. We at the Waltham Field Station started testing these products in 1956 for weed control efficiency and to determine how to safely use them

The two products and an untreated check plot used in 1956 were Mylone and Vapam Mylone was a 85 per cent wettable powder formulation used at a rate of ¾ pound per 100 square feet Vapam was a liquid used at a rate of one quart per 100 square feet. These materials were applied in a watering can and were thoroughly watered into the soil.

The object of these trials was to find how soon after the soil was treated on May 24th that plants could be safely set out. *Euonymus alatus, Forsythia ovata, Juniperus horizontalis, Rhododendron* "Roseum Elegans," and *Taxus media Hicks* were planted one, two, and three weeks after treatment In this experiment it was safe to plant one week following appication of Vapam but two weeks elapsed before it was safe to plant following the use of Mylone.

Both materials were effective in reducing the weed population in the bed area. Weeds from the walk areas rapidly encroached into the beds where they were not controlled. Cultivation, where soil containing weed seed may be thrown into the bed area, was not considered desirable.

During 1957, the trials were expanded to include bedding plants: *Ageratum houstonianum, Begonia semperflorens, Chrysanthemum morifolium, Coleus blumei, Hedera helix* and *Pelargonium hortorum,* as well as nursery stock: *Forsythia intermedia, Kalmia latifolia, Pieris floribunda, Pinus Thunbergi,* and *Taxus media Hicks.* Six plants of each type were set at each planting date, that is 7, 14, and 21 days after applying the soil treatments on May 8, 1958.

Materials and the rates of application on 100 square feet plots (5′ x 20′) were as follows: Allyl alcohol (Bedrench) 653 c c., chloropicrin 3 c.c.; injections on 6″ centers; methyl bromide 1 lb., Mylone ¾ lb., Vapam 1 quart, 1.5 mil black polyethylene, and an untreated control Allyl alcohol, Mylone, and Vapam diluted in 2 gallons of water were applied by means of a watering can followed by at least 15 gallons of water per bed Forty-eight hours were allowed for methyl bromide to diffuse under the plastic cover. Black polyethylene strips, three feet wide, were lapped and the edges buried to make a bed five feet wide.

Walkways were treated with either dinitro at a rate of 6 pounds per acre or Diuron at a rate of 1 pound per acre A one inch mulch of cocoa shells was applied over the herbicides to further suppress weed growth in the walkways

The following observations and conclusions were made on the 1957 experiments:

Allyl alcohol	No observable damage to crop plants, only 30 per cent weed control and therefore not satisfactory.
Chloropicrin	Nursery stock set out 7 days after treatment was killed Later plantings and bedding plants were not affected. Not effective for weed control
Methyl bromide	Plant growth was good. This proved to be the most effective treatment, over 95 per cent weed control
Mylone	No plant injury, plant growth good with approximately 85 per cent weed control
Vapam	No plant injury, plant growth good. Approximately 85-90 per cent weed control.
Polyethylene, Black	Crop plant development was best in this treatment, probably because of the more uniform soil moisture supply. Weeds also grew lushly in the planting holes This material doesn't seem suitable for bedding plants and small nursery stock because of the excessive labor involved in planting through the plastic film.
Control	Plant growth good but in general shorter than treated plots because of weed competition.

Our 1958 trials were set up using the most effective materials from the 1957 work, namely, methyl bromide, Mylone, and Vapam. EPTAM, a new material was used on three beds at rates of 10 and 20 pounds of active ingredient per acre The Eptam on clay and vermiculite carriers was applied to the soil surface and rotary tilled to a depth of 5 inches. In addition to the preplant treatments, post planting treatments of sugar cane mulch, bark mulch, and granular CIPC were used in these studies. This was done because, while these chemicals control 85 per cent or more of the potential weed population, 15 per cent or less of the potential population can soon overrun the beds. The weeds that survive the chemical treatment or seeds which blow into the beds grow rapidly too.

However, this reduced weed population is much easier to bring under control than the original weed population would have been.

The beds were treated on June 6th and all plants were set out ten days later. Plants used were. *Euonymus patens, Rhododendron yedoense poukhanense, Taxus media browni, Thuja occidentalis,* and *Viburnum juddi* The beds were 5′ wide and 20′ long and were subdivided into four, 5′ by 5′ areas for the three post planting treatments and the control area Bark and sugar cane mulches were applied the day after planting to a depth of two inches Granular CIPC was applied at the same time at a rate of 160 pounds per acre of a 5 percent material.

Ten days did not prove to be sufficient time for the Mylone to dissipate, since only 96 of 300 plants survived. Survival results (81 per cent) with Vapam possibly would have been better had a longer time elapsed between soil treatment and planting These figures can be compared with 91 per cent survival in the control plots and 98 per cent in the methyl bromide plots. The post planting treatments appeared to have little influence on the survival of the crop plants. There was no loss of plants in the Eptam treated plots which had only a few representative plants in them, although the 20 pound rate appeared to generally inhibit the growth

During the first month, little weed growth took place, except in the check plots which had to be weeded Sugar cane mulch proved to be the most effective secondary treatment on these plots followed by CIPC and bark mulch

By the second month the check areas of all plots except those treated with Eptam required hand weeding The Eptam plots were completely clean at this time. Sugar cane mulch continued being the most effective post planting treatment. More of the surface of the bark plots was covered with weed growth than the CIPC plots at this time Since there were a few large weeds instead of many small weeds, it was easier to weed the bark plots.

Three months after the soil treatments were applied the Eptam plots were still weed free Only a small amount of weed growth had occurred in the mulched areas of the other plots following weeding. By this time any residual effect of CIPC had disappeared It was not until four months after treatment that some weed growth, ie, henbit and chickweed, started to develop on the Eptam treated soil This growth was still less than that on the other plots

The following conclusions have been drawn from these studies·

(1) Eptam appears to be a very promising preplanting herbicidal material when applied to dry soil.

(2) Methyl bromide continues to be somewhat superior in herbicidal effectiveness to Mylone and Vapam. Better growth also resulted where it was used, possibly due to its shorter residual activity in the soil.

(3) Sugar cane mulch proved to be the most effective post planting treatment

In summary, I would like to point out a few general conditions for successful use of preplanting herbicides and specific conditions peculiar to certain chemicals Soil moisture should be at a satisfactory level for

seed germination at the time of application. The soil should be prepared for planting before the chemicals are applied. Soil temperature should be 60° F. or higher for satisfactory results. Two weeks generally should elapse from the time of treatment to planting to allow the chemicals to dissipate.

Methyl bromide must be applied under a plastic cover. It can be applied to soils whose temperature is below 60° F. if the liquid is vaporized to a gas before application. Methyl bromide, of the chemicals tested has the shortest residual life in the soil

Mylone can be either rotary tilled into the soil or carried in by water. Since this chemical breaks down slowly, planting should not be done for at least two weeks.

Vapam should be applied to a soil surface which is moist and not hot, otherwise it volitilizes to form a tear gas like substance Many Vapam applications fail because insufficient water is applied immediately after applicatlon to carry it into the soil At least one inch of water should be used.

Eptam should only be applied to a soil surface which is dry otherwise it will volitilize rapidly No water seal is necessary when Eptam is rotary tilled into the soil

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MODERATOR NELSON. Thank you. Professor Kamp. Is there any discussion anyone would like to bring up at this point?

PROFESSOR J. C. McDANIEL (University of Illinois, Urbana, Illinois): I would like to make one comment on the previous paper.

It is concerned with the nomenclature on the Smoke Tree. At least as far back as the 1920 edition of Bailey's Nursery Manual the Smoke Tree has been separated from the genus *Rhus.* The correct name of this plant is *Cotinus coggygria.*

(*Editor's Note*: Dr. Chadwick was unable to attend this session and presented his paper during the Question Box Session on Friday evening, December 5, 1958. It is included at this, the regularly scheduled time for reason of continuity.)

CONTROLLING SPRING WEED GROWTH IN TAXUS BY FALL APPLICATIONS OF HERBICIDES

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One of the major problems in the control of weeds in commercial nurseries is the suppression or elimination of weed growth early in the spring. Cultivation is often difficult to accomplish during this season due to unfavorable soil conditions or because nurserymen are busy digging, shipping or planting stock at that time. This experiment was conducted to determine the effectiveness of some herbicides applied during the fall on the elimination or suppression of weeds the following spring If it is found that herbicides can be applied in the fall and suppress or