

# Effectiveness of Various Dosages of Allyl Alcohol with DD as a Pre-emergent Weedkiller in Tobacco Seedbeds<sup>1</sup>

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## INTRODUCTION

Weeding is one of the most expensive operations in tobacco seedbeds and can be instrumental in spreading disease. Damping-off, black shank, and common mosaic, the most harmful diseases in tobacco seedbeds in Puerto Rico, can be easily transmitted by laborers during weeding. It is also well-known that nematodes can impair the vigor and growth of seedlings. Healthy and vigorous tobacco seedlings must be used to obtain optimum yields. They can be obtained through adequate fumigation of seedbeds. The use of some chemicals such as DD, methylbromide, allyl alcohol, and others has proved effective either in the control of nematodes, weeds, or diseases. Allyl alcohol with DD, a mixture of 3 parts of allyl alcohol and 1 part of DD (1-3 dichloro-propene, 1-2 dichloropropane) by volume, has been recently recommended to control weeds and nematodes in seedbeds.

This paper reports the results obtained in experimental tobacco seedbeds where three different dosages of allyl alcohol with DD and three intervals for seed-sowing after application of the chemical were tested.

## REVIEW OF LITERATURE

Cibes and Amy (1)<sup>3</sup> used a dosage of 1½ gallons of allyl alcohol in 100 gallons of water per 1,000 square feet on experimental tobacco seedbeds obtaining effective weed control without affecting germination when tobacco seed were sown a week after application of the chemical. Ortiz and Sepúlveda (2) found that a mixture of 81 percent of allyl alcohol and 11.5 percent of ethylene dibromide, at a rate of 1½ gallons in 100 of water per 100 m<sup>2</sup>., was superior to methylbromide in controlling weeds in tobacco seedbeds. Barbosa and Lugo-López (3) recently reported highly significant differences in weed control in coffee seedbeds between untreated check plots and those that received allyl alcohol treated at rates of 1, 2, and 3 gallons per 1,000 square feet.

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<sup>3</sup> Italic numbers in parentheses refer to Literature Cited, p. 101.

### MATERIAL AND METHODS

The experimental area was located in a Mabí clay at the Gurabo Substation. The experiment was conducted from August to September 1959. A split-plot design was used and each main plot was replicated four times. The treatment of the main plots consisted of dosages of 1, 2, and 3 gallons per 1,000 square feet of allyl alcohol with DD, and an untreated check plot. Subplots had three different intervals for sowing tobacco seed after the chemical was applied, that is, 5, 10, and 15 days. Plots were 3 x 5 feet in size and the soil was prepared in the usual way as in commercial seedbeds. The chemical was diluted in 50 gallons of water to be used on each 1,000 square feet. The solution was evenly applied during the morning using 2½-gallon water buckets.

A half-gram of seed of the variety Selección Olor mixed with DDT at 5 percent was sown in each plot. A 6-8-10 fertilizer was broadcast a day before sowing at the rate of 15 hundredweights to the acre. Seed were sown at 5-, 10-, and 15-day intervals after fumigation as required. Plots were covered with cheesecloth which was supported on wire arches 16 inches above the soil surface. Cultural practices and insect and disease control followed standard Station recommendations. Weeds in each plot were hand-picked and weighed. Transplantable seedlings were pulled and counted. The weight of weeds was used for evaluating efficiency of the chemical as a weedkiller while the number of transplantable seedlings was the criterion used to determine the effect of dosages and time interval upon seed germination.

### RESULTS AND DISCUSSION

Table 1 gives the mean weights of weeds picked and mean yields of transplantable seedlings for each treatment. The total weight of weeds obtained from plots treated with the various dosages of allyl alcohol and DD (see table 2) was significantly lower than that obtained from untreated plots. No significant difference was obtained when 1, 2, and 3 gallons of the chemical were used. Differences observed in the mean weight of weeds are presumably due to random effects rather than to the different concentrations of allyl alcohol and DD.

No significant differences in seed germination were observed when tobacco was sown 5, 10, or 15 days after the chemical was applied, as is shown in table 3. It might be well to point out that sunny days of normal evaporation followed the application of the chemical. Perhaps on cloudy days it might be advisable to wait for longer time intervals, say 9 or 10 days, before sowing, as toxic chemical effects might remain over the soil for longer periods, affecting seed germination. Current commercial practice is to sow seed following a 15-day interval after treatment, however, the

data obtained in this experiment show that mixtures of allyl alcohol and DD at a proportion of 3:1 by volume do not injure seed germination even when seed are sown only 5 days after treatment.

TABLE 1.—*Mean weight of weeds and number of transplantable tobacco seedlings per treatment*

Treatments	Mean weight of weeds	Mean yield of seedlings
	Grams	Number
1 gallon — 5 days	42.7	1,832
1 gallon —10 days	47.8	1,840
1 gallon —15 days	64.7	1,946
2 gallons — 5 days	44.6	2,175
2 gallons —10 days	79.0	2,022
2 gallons —15 days	85.9	2,046
3 gallons — 5 days	92.3	1,913
3 gallons —10 days	62.9	1,761
3 gallons —15 days	59.7	1,738
Untreated— 5 days	289.5	1,778
Untreated—10 days	361.5	1,895
Untreated—15 days	184.2	1,889

TABLE 2.—*Summary of the analysis of variance of the weight of weeds picked from the experimental tobacco seedbeds*

Source of error	Degrees of freedom	Sum of squares	Mean square	F values		
				Experi- mental	5 percent	1 percent
Replication	3	15,427.25	5,142.42			
Concentration	3	415,157.66	138,385.89	6.93 <sup>1</sup>	3.86	6.99
Error (a)	9	179,780.69	19,975.63			
Intervals	2	12,300.31	6,150.16	.55	19.45	99.46
Concentration × in- tervals	6	58,834.78	9,805.80	.88	3.84	7.31
Error (b)	24	266,176.48	11,090.69			
Total	47	947,677.17				

<sup>1</sup> Significant at the 5-percent level.

Allyl alcohol with DD is as efficient as allyl alcohol alone as a pre-emergent weedkiller. It also seems to reduce seedbed disease incidence, since very few cases of damping-off were observed in the treated plots. Seedlings obtained were healthy and vigorous as they were grown free from diseases, nematodes, and weed competition. The main advantage of the use of allyl alcohol with DD is that, with the use of this chemical, nema-

todes, fungous diseases, and weeds can be controlled in one operation without additional expense. It is necessary that tobacco seedlings be free from nematodes because infected plants undoubtedly are responsible for the spread of the organism to the tobacco fields, reducing yields considerably. The efficiency of DD as a nematocide has been proved with different crops including tobacco, obtaining a very good control over nematodes. The use of this chemical will favor those tobacco growers who make their own seedbeds.

It is necessary to emphasize that the allyl alcohol is poisonous and irritant, so farm workers should observe adequate protection measures.

TABLE 3.—*Summary of the analysis of variance of transplantable seedlings pulled from the experimental tobacco seedbeds*

Source of error	Degrees of freedom	Sum of squares	Mean square	F values		
				Experimental	5 percent	1 percent
Replications	3	1,050,424.3	350,141.43			
Concentration	3	537,715.8	179,238.60	2.136	3.86	6.99
Error (a)	9	755,358.5	83,928.72			
Intervals	2	16,226.8	8,113.40	.012	19.45	99.46
Concentration × intervals	6	178,859.4	29,809.90	.038	3.84	7.31
Error (b)	24	1,903,259.2	79,302.47			
Total	47	4,441,844.0				

#### SUMMARY

The data reported here indicate that allyl alcohol and DD controlled weeds efficiently on tobacco seedbeds, reducing weeding costs considerably. As no differences were observed when 1, 2, or 3 gallons of the chemical were compared, it can be concluded that a dosage of 1 gallon diluted in 50 gallons of water is as efficient when used as pre-emergent weedkiller as the heavier dosages. Neither the dosages nor the intervals at which to sow the seed after fumigation affected seed germination. No difference in the amount of transplantable seedlings was obtained when seed were sown at 5-, 10-, and 15-day intervals. Hence seed can be sown 5 days after chemical application without risk of affecting germination under normal weather conditions. The use of allyl alcohol with DD is not only efficient as a pre-emergent weedkiller, but is also harmless to germination if seed are sown at least 5 days after application. At the same time seedlings produced on treated plots were healthy and vigorous since they grew free from harmful effects

of weed competition and disease and nematode damage. Vigorous seedlings free from diseases and nematodes could increase yields per acre, while using infected material may spread and infect tobacco fields.

#### RESUMEN

De un experimento realizado en un semillero de tabaco para observar la eficiencia del alcohol alílico con DD como yerbicida preemergente, y también para determinar el tiempo que se debe esperar para regar la semilla después de aplicado el tratamiento químico, se obtuvieron los siguientes resultados:

1. El uso del alcohol alílico con DD fue eficaz para controlar los yerbajos del semillero, al compararse este tratamiento con los predios sin tratar.

2. No se observó diferencia significativa alguna entre las distintas proporciones del compuesto usado, por lo que se recomienda aplicar 1 galón de alcohol alílico con DD, todo diluído en 50 galones de agua por cada 1000 pies cuadrados de superficie de semillero.

3. Si las condiciones climáticas son normales, se puede regar la semilla 5 días después del tratamiento, pues en ninguno de los tres intervalos probados pudo observarse que la germinación se afectara significativamente.

4. El uso del alcohol alílico con DD en los semilleros reduce considerablemente el costo de producir plantitas de tabaco para las siembras comerciales; además, las plantitas producidas en los predios tratados se desarrollan con gran vigor, ya que se reduce la incidencia de enfermedades y de nemátodos.

#### LITERATURE CITED

1. Cibes, H. R., and Amy, A. S., Control of weeds in tobacco seedbeds, *J. Agr. Univ. P.R.* 40 (1) 85, 1956.
2. Ortiz, G., and Sepúlveda, R., Efectos de Varios fumigantes de suelos en el control de malezas y de la enfermedad del sancocho o natilla en los semilleros de tabaco, *Agric. Tropical*, Colombia, 12 797-803, 1956.
3. Barbosa-Cupeles, J. E., and Lugo-López, M. A., Use of allyl alcohol as pre-emergent weedkiller in coffee seedbeds, *J. Agr. Univ. P.R.*, 45 (2) 112-55, 1961.