

RESEARCH NOTE

EFFECTS OF THREE HERBICIDES ON WEED CONTROL, YIELD AND VALUE OF FLUE-CURED TOBACCO¹By W. K. COLLINS, S. N. HAWKS JR. and B. U. KITRELL²Dept. of Crop Science
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The role and value of herbicides in flue-cured tobacco have been established (1, 2, 3, 4). These studies have shown that even when a herbicide is used it is usually beneficial to cultivate tobacco twice, one cultivation when tobacco receives sidedressing nutrients about two weeks after transplanting, and a second at layby time. The reasons given for these cultivations are (1) to build up a row ridge to reduce drowning, (2) to increase water infiltration, (3) to control resistant weeds, and (4) to facilitate the removal of lower leaves by mechanical harvesters being developed.

Currently, three herbicides, diphenamid³, isopropalin⁴, and pebulate⁵ are registered with a full or experimental label for use on flue-cured tobacco in the United States. Diphenamid is sprayed over the top of transplanted tobacco during the transplanting operation or in a separate operation immediately after transplanting. It provides near full-season control of most annual grasses and some broadleaf weeds. Isopropalin is a preplant soil-incorporated herbicide which provides near full-season control of most annual grasses and some broadleaf weeds. Pebulate is a preplant soil-incorporated herbicide that gives early suppression of nutsedge, control of annual grasses and some broadleaf weeds for about six weeks after application.

This paper reports results from an on-farm test conducted at six locations in 1971 comparing diphenamid, isopropalin and pebulate treated tobacco which received two cultivations or no cultivations. Weed control, yield and value of flue-cured tobacco grown under varied edaphic, climatic and management conditions were evaluated in these tests.

Chemicals (Table 1) were applied with a backpack carbon dioxide pressure sprayer which delivered the chemicals through 49 x 49 Monarch whirl-chamber hollow cone nozzles @ 20 p.s.i. @ 3 mph to provide

18.3 gallons per acre of solution as a broadcast treatment. Soil incorporation was accomplished using a tandem disc set to cut to a depth of 3 to 4 inches and operated twice over the field in the same direction. Plot size was .029 of an acre. The treatments were replicated twice in a randomized block design. Varieties and cultural practices were those considered desirable and normally used by the farmer for the production of flue-cured tobacco.

The cultivated plots received two cultivations, "2nd normal and layby". The first cultivation was made at the time for the normal second cultivation which is usually the time sidedressing nutrients are applied to the soil. The "layby" cultivation refers to the last time the tobacco is normally cultivated. During each cultivation soil was pushed toward the plant to build up a large, high row ridge.

The cured tobacco was sorted into "farm grades," weighed, and assigned U.S. Official Standard Government grades by a U.S. Department of Agriculture Tobacco Inspector. Each grade was assigned a price

Table 1. Effects of diphenamid, isopropalin and pebulate with two cultivations and no cultivation on weed control, yield per acre, value per acre and price per hundredweight

Treatments ^a	Method	Weed Control Ratings ^b	Yield lbs/A	Value \$/A	Price \$/cwt
Diphenamid @ 4.0 lbs/A and no cult.	PP ^c	6.8	2135	1673	78.35
Isopropalin @ 1.5 lbs/A and no cult.	PPI ^d	4.8	2017	1583	78.52
Pebulate @ 4.0 lbs/A and no cult.	PPI	4.0	1829	1430	78.18
Diphenamid @ 4.0 lbs/A & 2nd normal and layby cultivations	PP	8.8	2387	1873	78.45
Isopropalin @ 1.5 lbs/A & 2nd normal and layby cultivations	PPI	8.4	2263	1774	78.38
Pebulate @ 4.0 lbs/A & 2nd normal and layby cultivations	PPI	7.1	2299	1810	78.72
Control—2nd normal and layby cultivations	PPI	7.1	2212	1732	78.33
L.S.D. .10		1.3	275	217	NS
C.V. %		10.0	10	10	1

^a All rates used in this paper are expressed as pounds of active ingredient per acre.

^b 0 to 10; 0=0% weed control; 10=100% weed control.

^c PP is post transplant applied overtop of the tobacco after transplanting, a PPI is preplant prebedding soil incorporated with a tandem disc operated twice over set to cut a depth of 3 to 4" immediately after herbicide application.

¹ Paper number 125 of the Journal Series of the North Carolina State University Agricultural Extension Service, Raleigh, North Carolina. ² Professors and Extension Agronomy Specialist, Department of Crop Science, North Carolina State University, Raleigh, N. C. 27607. ³ Diphenamid (N,N-dimethyl-2,2-diphenylacetamide) commercially available as "Enide." ⁴ Isopropalin-(4-isopropyl-2,6-dinitro-N,N-dipropylaniline) available with experimental label as "Paarlan." ⁵ Pebulate-(S-propyl butylethylthiocarbamate) commercially available as "Tillam." Use of trade names in this publication does not imply endorsement of the product named or criticism of similar ones not mentioned.

which was obtained from the auction price for that grade in Types 12, 13 and 14 during 1970 and the 1971 market auction period through September 10. The grade weights and prices were used to compute the pounds and value per acre and price per hundredweight in dollars.

Weed control ratings were made when the tobacco was in the flower stage. The treatment effects on weed control, yield and value per acre and price per hundredweight are shown in Table 1.

Crabgrass (*Digitaria* sp.) was present at all locations. Other susceptible weeds present in at least one of the locations were: Yellow foxtail (*Setaria lutescens*), smartweed (*Polygonum* sp.) and redroot pigweed (*Amaranthus retroflexus*). Resistant weeds observed in the tests were: tall morningglory (*Ipomoea purpurea*), Carolina horsenettle (*Solanum carolinense*), bermudagrass (*Cynodon dactylon*), cocklebur (*Xanthium pennsylvanicum*), common ragweed (*Ambrosia artemisiifolia*), purple nutsedge (*Cyperus rotundus*) and yellow nutsedge (*Cyperus esculentus*).

A comparison of the weed control ratings in Table 1 for the tobacco treated with herbicides and no cultivation (diphenamid, 6.8; isopropalin, 4.8; and pebulate, 4.0) shows that diphenamid was superior to isopropalin and pebulate, both of which provided similar weed control. Weed control for all of the herbicides was considered unsatisfactory where no cultivations were used.

Weed control was consistently improved where a herbicide plus two cultivations were used compared to a herbicide without cultivation. Where two cultivations were used, the degree of weed control was similar for diphenamid and isopropalin, both being superior to pebulate. The weed control ratings show that pebulate plus two cultivations provided no better late season control than was obtained with the control. A significant treatment by locations interaction was observed in the data, much of which can be related to the relatively poor performance of isopropalin at one location. High soil moisture at the time the isopropalin was applied and

relatively high clay content of the soil at this Granville County, North Carolina location may have influenced the performance observed.

Comparisons of yields of tobacco treated with herbicides without cultivations show that diphenamid gave the highest yield and pebulate the lowest. Values per acre followed the same trend as the yields since no difference was found among prices per hundredweight.

Yield and value per acre were improved where a herbicide with two cultivations was used compared to the use of a herbicide without cultivations. This observation supports previous findings (1, 2, 3, 4) on the beneficial effects of cultivating flue-cured tobacco. Another factor possibly related to the reduced yields and values per acre observed for the tobacco in this test, which received a herbicide and no cultivation, might be the availability of nutrients from the sidedressing fertilizers. Where no cultivation was used, the sidedressing fertilizer (approximately one-third of the total nitrogen and potassium used) was applied on top of the soil without being covered. This could have affected the availability of nutrients. Without some leaching they could not reach the active root zone. Also, they would be more subject to removal in runoff water than if covered.

Where two cultivations were used, tobacco yields from the three herbicides treatments were similar to that of the control; however, there was a trend for increased yields where a herbicide was used. The numerical increase was greatest for diphenamid. The value per acre followed the same trend since no difference was observed in price per hundredweight.

LITERATURE CITED

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