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INVESTIGATIONS ON POST-ATTACHEMENT CONTROL OF DODDER (*CUSCUTA SP.*) ON DURANTA EVERGREEN SHRUBS

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Abstract

Seeking suitable application for controlling dodder on evergreen trees was the aim of the present research.

The trial comprising 17 post-attachment treatment a long side with a check was carried out during 1992. Patches of dense infestation with dodder (*Cuscuta compestris yuncker* and *C. indecora*) on *Duranta plumiei jacq* fense were thoroughly sprayed with different herbicides at low consentrations. Roundup as well as Scepter surpassed all other herbicides. The worthful treatments were:

(a) Roundup + Herbex (500 + 500 ppm) then Roundup (500 ppm) with such treatment the renewal growth of Duranta (after pruning might appear with somewhat betterment.

(b) Scepter (1000 ppm) then Scepter (100 ppm).

(c) Roundup + Scepter (500 + 500 ppm).

Preliminary tests showed the tolerance of citrus trees, onion transplants in the nursery and alfalfa plants to such effective herbicidal treatments.

INTRODUCTION

Dodder (*Cuscuta spp.*) is a plant parasite. The genus comprises several species that attack numerous species of dicotyledonous plants. Mechanical barriers prevent haustorial penetration and infection of Cramineae family plants (Tsivion, 1979).

Tackholm (1974) gave the identification of seven *Cuscuta* species and one variety in Egypt. Al-Shair (1986) recorded three species in different crops in the Nile Delta. Dodder plant is allowed to grow to maturity produces abundant seeds, most of which are hard and do not germinate all at once (Caertner, 1950). Mostly, the dormancy is attributed to the impermeability of the seed coat (Dawson *et al.*, 1965). Seeds 2-3 years old germinated readily in the top 0.5 cm of soil but germination decreased with depth. The optimum age for germination was 4-6 years (Karapetyan, 1972). The hard seed can remain viable in the soil for many years. They germinate whenever environmental conditions are favorable after the impervious nature of the seed coat has been broken and becomes permeable to oxygen and water. The optimal temp. for seed germination differs with species since it is 20°C for *C. epithymum* and *C. prodoni* whereas it is 30-33°C for *C. campestris* (Stajanovic and Mijatovic, 1973). Dodder unlike certain other parasitic plants does not require stimulation from the host plant for its seed to germinate. It cannot survive alone but must attach itself to a host plant to live beyond the seedling stage. On contacting the stem of the suitable host plant, the dodder seedling twines around it and sends haustoria to penetrate deeply to the cambium and to the translocating vascular bundles (Dorr, 1972 and Thoday, 1911).

Physical methods such as shading, tillage, dryness of the soil surface are means of dodder control (Dawson *et al.* 1965 and Dawson, 1966). Certain herbicides (soil acting) are applicable for preventive protection through germination inhibition and killing dodder seedlings before attaching to the host plant. Mostly the favorable herbicides for such purpose were chlorpropham (Lee and Timmons, 1954), dacthal (Bayer *et al.* 1965) and pronamide (Dawson, 1978). Because dodder hard seeds lose their dormancy gradually and continually with time and become capable of germination, new seedlings may emerge during much of the growing season. Such nature with stands the prevention protection. Once dodder has penetrated the host, the selective control is very difficult and the foliage of the parasitised host plant must be destroyed in order to kill the dodder.

For post-attachment dodder control different chemicals were tried out, some of which has been referred to a worth while. These are: diquat (Cimesi, 1966), glyphosate (Dawson and Saghir, 1982 and 1983); sulfosate (Dawson, 1984, 1989 and 1990).

The purpose of the present work is to show the possible use of certain translocated herbicides for post-attachment dodder control selectively on perennial ever-

green host plants *Duranta shrubs*.

MATERIALS AND METHODS

On a fence of evergreen shrubs of *Duranta repens* L., *Duranta plumieri* Jaqu. (In shooting club, Dokki, Giza) the heavy infestation of dodder (Large seed *C. indecora*) and/or field dodder (*C. campestris* Yuncker) drew our attention to search for applicable post-attachment dodder control. Dodder can be a problem in citrus trees, especially in the carelessly maintained orchards. The question of herbicide residues in the citrus fruits of the treated trees should be taken into consideration.

The present work started in the early summer of 1992 for a period of ten months comprising 17 different treatments with 10 different herbicides (Table 1).

A patch of 10 meters length of the fence with profusely growing and attached dodder was allocated for each treatment. Chemical solutions were sprayed thoroughly with a hand sprayer at a volume rate of 500 l/ha.

Visual observations were considered for eventual grading taking into account the effect on the parasite and the host as well.

RESULTS AND DISCUSSION

After dodder is attached to the host plant it is very difficult to control selectively (Dawson *et al.* 1984). Thus, acceptable post-attachment treatment should be seeked.

With reliable treatment the herbicidal application would be restricted to seeable infestation. Therefore the cost could be lower.

Data shown in Table 1 reveal the educible findings that can be worthly noted as follows:

Certain treatments appeared as the most favorite since they resulted in the appreciable effect on existed dodder (100%) as well as on imbeded haustoria within the host plant. The absence of regeneration for a long time (25 weeks) after treatment could be attributed to such latter effect. These treatments are:

1. Roundup + Herbex (500 + 500 ppm) then Roundup (500 ppm) 3 weeks.

2. Roundup + Scepter (1000 + 1000 ppm).

3. Scepter (1000 ppm) then Scepter (1000 ppm) 3 weeks later.

Notably where such translocated herbicides were applied at once or with the lower conc. (500 ppm) either separately or in combination the results were not completely satisfactory. In such cases with Roundup Scepter pursuit (phloem-mobile herbicides) *Cuscuta* regeneration appeared with deformations.

Seemingly the addition of Herbex might be the reason for better regrowth of the treated host plant.

Dawson and Saghir (1982 and 1983) pointed out that glyphosphate is of great interest because it controlled dodder at very low rate (0.075 kg/ha). Dawson (1989 and 1990) pointed out that glyphosate at 75 or 150 g/ha controlled *C. campestris* and *C. indecora* without injury to newly sown lucerne. Dodder began to grow again 2-3 weeks after treatment but could be controlled by 2-3 applications of glyphosate. A glyphosate rate of 40 g/ha was not effective.

Fer (1984) reported that in experiments carried out with 14 C labelled herbicides, glyphosate in particular showed promise for selective control. He pointed out that the concentration of glyphosate was 16-Fold higher in the parasite than in the host leaf blade. The same author stated that the glyphosate accumulated much more in the apical part of *Cuscuta* shoot (especialy in the buds) than in the haustorial coil. Therefore, the phenomenon of regenerating new shoots and flower clusters directly from the haustorial coil of dodder in the check as well as in inefficient treatments, could be interpreted.

Truscott (1958) showed the haustoria within the host plant usually are not injured with the herbicide and will regenerate normal shoots.

Table 1. Effect of different herbicidal treatment for post attachment dodder control on *Duranta plumiei* (Dokki, Giza, 1993)

	Herbicide	Active in gredient	Conc. ppm	Treat. date	Temp. oC	% dodder kill after3 weeks	% dodder regener after3 weeks
1	Roundup (63% wso) + Herbex then Roundup (36% wsc)	glyphostrte + humic acid glyphosate	500 + 500 than 500	50/10	34	100	0
2	Roundup (36% wsc) + Scepter (15% AS)	glyphosate + imazaquin	1000 + 1000	13/10	35	100	5
3	Scepter then Scepter (15% AS)	imazaquin + imazaquin	1000 then 1000	20/10	34	100	5
4	Roundup (36% wsc) + Scepter (15% AS) + Herbex	Glyphosate + imzazquin + humic acid	500 + 500 + 500	20/10	34	100	10
5	Scepter (15% AS)	imazaquin	1000	1/9	33	100	15
6	Roundup (36% wsc) + Coal (24% EC)	clyphosate + oxyflourfen	500 + 500	21/7	33	100	25
7	Roundu[(15% wsc) + Harbex	Glyphosate + oxyflourfen	500 + 500	20/10	34	100	40
8	Roundup	Humic acid	1000	6/6	35	100	50
9	Pursuit (10% EC)	imazethapyr	1000	6/6	35	100	60
10	Coal	oxyficuorfen	1000	14/7	35	100	80
11	Kerb (50% wp)	pronamide	1000	29/7	35	100	90
12	Reglone (20% AS)	diquat	1000	26/10	34	85	90
13	Reglone + Basagran 58% AS)	diquat + Bentazon	1000 + 1000	12/8	33	80	90
14	Coal + Callant (12.5% EC)	Oxyflourofen + Haloxyfez	500 + 500	12/8	34	80	90
15	Basagran	Bentazon	1000	26/10	35	15	100
16	Callant	Haloxyfep	500	12/8	34	30	100
17	Ronstar P: (40% EC)	oxadiazon + proanil	1000	26/8	35	30 0	100
18	Check						

EC = emulsifiable concaentration
WSC = water solution concentration
AS = Aquous solution

It is evident that imazaquin (Scepter) performed well as glyphosate (Roundup). Both are translocated herbicides; phloem and xylem mobile ones. Glyphosate has been tried out and eventually recommended for *Orobanche* (Plant parasite) control (Zahran, 1982). Likewise Scepter has been regarded as worthwhile (Sauerborn and Saxena, 1986 and Zahran *et al.* 1988).

Apparently, treatments other than the three mentioned in the foregoing appeared either with some or no value. However, it could be concluded that the translocated herbicides that were properly applied in the present study being Roundup and Scepter deserve further evaluation with different hosts.

In a preliminary test at Quena (Upper Egypt), in the beginning of winter time (December 1992), citrus trees onion transplants in the nursery and alfalfa tolerated the effect of both Roundup and Scepter as described with the most efficient treatments mentioned in the foregoing.

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دراسة مكافحة الحامول المتطفل على شجيرات الدورانتا دائمة الخضرة

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قسم بحوث مقاومة الحشائش – مركز البحوث الزراعية – الجيزة

يهدف البحث الى التوصل للمعاملات المناسبة لمكافحة الحامول المتطفل على شجيرات الدورانتا دائمة الخضرة ، لذلك نفذت تجربة اشتملت على سبعة عشرة معاملة تم رشها على الحامول المتطفل بالاضافة الى معاملة المقارنة وذلك خلال عامى ١٩٩٢ ، ١٩٩٣.

وقد رشت الاماكن المصابة بشدة بالحامول المتطفل على شجيرات الدورانتا بتركيزات منخفضة من مبيدات مختلفة.

وقد خلص البحث الى النتائج التالية:

(١) تفوقت معاملتى الرواند آب (Roundup) ،السبتور (Scepter) على كل المبيدات الأخرى وكانت افضل المعاملات هى:

أ- رواند آب + هيربكس (Herbex) (٥٠٠ + ٥٠٠ جزء بالمليون) ثم راوند آب (٥٠٠ جزء فى المليون) ومع تلك المعاملة ظهرت النموات الجديدة للدورانتا (بعد تقليمها) بصورة افضل نوعا ما.

ب- سبتر (١٠٠٠ جزء بالمليون) ثم سبتر (١٠٠٠ جزء بالمليون).

ج- راوند آب + سبتر (٥٠٠ + ٥٠٠ جزء بالمليون).

(٢) اظهرت الاختبارات الاولية التى اجريت فى ديسمبر ١٩٩٢ بقنا تحمل أشجار الموالح ومشاتل البصل ونباتات البرسيم الحجازى لتلك المعاملات الكيمائية المعالجة.