Short Communications

EFFECT OF TRIFLURALIN ON GERMINATION, GROWTH AND NODULATION IN CHICKPEAS (*CICER ARIETINUM* L.)

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Abstract

Shad, R.A. and S.A. Chaudhry. 1985. Effect of trifluralin on germination, growth and nodulation in chickpeas (*Cicer arietinum* L.). Arab J. of Pl. Prot. 3: 101 - 103.

A study on the effects of trifluralin (α, α, α, tridluro - 2, 6 -dinitro- N, N - dipropyl -p - toluidine) showed that this herbicide depressed germination, root and shoot development till 5 geaf stages, and resulted in decreased root nodulation in the plants by about 3%, under field conditions in the Beqa'a plain of Lebanon. A supporting study with chickpea plants conducted in pots in Beirut showed similar effects on chickpea plants, except that trifluralin did not show any direct effect on nodulation.

Introduction

Various workers (1, 3, 5) have recommended trifluralin (α, α, α, trifluro -2, 6 - dinitro -N - N - dipropyl - p - toluidine) as a herbicide in legumes including chickpeas. Conflicting reports are cited in literature concerning the effect of trifluralin on chickpeas and other legumes (2, 3, 4).

A field study was, therefore, carried out during the years 1974 and 1975 at the Agricultural Research è Education Center of the American University of Beirut (AUB) in the Beqa'a plain of Lebanon to study the effect of trifluralin on chickpea plants concerning germination, growth and nodulation.

Materials and Methods

Field studies were conducted in 1974 and 1975 at the Agricultural and Education Center in the Beqa'a valley of Lebanon. In both years the experiments were laid-out in a split plot design with the following treatments:

Main plot = Variety 360 - 1 (Pakistan) and local variety (Lebanon)

Sub plots = Methods of weed control: 1) No weeding 2) Hand weeding 3) Trifluralin application.

Trifluralin at 0.50 kg / ha in 1974 and 0.75 kg / ha was incorporated into the soil with a rotatiller before planting. All seeds were inoculated with a proper strain of *Rhizobium* to provide full opportunity for nodulation.

In case of pot experiment in the greenhouse the following treatments were studied: 1) Inoculum + trifluralin 2) Inoculum + No trifluralin 3) No inoculum + No trifluralin. 4) No inoculum + trifluralin.

Soil used in this experiment was taken from Beqa'a plains and was sterilized before use. Trifluralin at 0.75 kg / ha was thoroughly mixed with the soil. Seeds, needed, were inoculated with proper strain of *Rhizobium.*

For the purpose of inoculation, in both studies, seeds were moistened with small amount of water. The seeds were then shaken along with the inoculum in a drum to ensure uniform application of inoculum. The treated seeds were planted immediately after the treatment.

Besides others, data were recorded on the following parameters which are presented in this paper: 1. Root and shoot weight. 2. Nodule weight at flowering. 3. Visual observation on the growth (No numerical data).

The data were analysed by the analysis of variance method as well as «t» test using paired plot techniques.

Results and Discussion

Visual Observations. Trifluralin was observed to delay germination by 5 - 7 days as compared to the control. Trifluralin produced deformed seedling which started recovering after th 5 - leaf stage. Till the 8 - 9 leaf stage, trifluralin-treated seedlings produced narrower leaves with poorer glandulation as compared to the control. The roots of seedlings did not show a normal state of growth with trifluralin treatment as compared to the control. As an effect of trifluralin, seedlings produced primary branches of shoot earlier than the control, though the number of primary branches did not differ from control. These observations indicate that trifluralin depressed germinations, as well as root and shoot development at earlier stages of growth and development.

Root and Shoot Weight. It was found that control plants had higher root and shoot weights than trifluralin treated plants as indicated by significane at the 1% level in both tests (Tables 1 and, 2). The mean dry weight in the case of control plants was 10.654 gm for roots, and 12.735 gm for shoots as compared to trifluralin-treated plants, which was 6.865 gm for roots and 8.730 for shoot. These data indicate that trifluralin inhibited cell division which resulted in a decreased root and shoot growth.

Table 1. Average weights of roots, shoots and nodules as affected by trifluralin treatments.

جدول ١ ـ تأثير معاملات الترايفلورالين على متوسط وزن الجذور والفروع والعقد البكتيرية .

Tratments المعاملات	Weight (in grams) الوزن (غ)		
	Roots الجذور	Shoots الفروع	Nodules العقد البكتيرية
No trifluralin (To) شاهد	10.654**	12.735**	2.159*
Trifluralin (TR) ترايفلورالين	6.865	8.730	2.219

* Significant at 5% level

** Highly significant (1%)

* الفارق المعنوي على مستوى ٥٪

** الفارق المعنوي على مستوى ١٪

Table 2. Mean square values for the analysis of variance for weight of roots, shoots and nodules of chick pea.

جدول ٢ ـ المعدل الوسطي لمربع القيم لتحليل تباينة وزن جذور وفروع وعقد البكتيرية لنبتة الحمص .

Source of variation مصدر التباين	Degrees of freedom درجات الحرية	Mean squares المعدل الوسطي لمربعات القيم		
		Roots الجذور	Shoots الفروع	Nodules العقد البكتيرية
Replications المكررات	4	0.14	0.70	7.49
Treatments المعاملات	1	35.70**	40.09**	7.74*
Error الخطأ	4	2.59	0.05	1.25
Total المجموع	9			

* Significant at 5% level

** Highly significant (1%)

* الفارق المعنوي على مستوى ٥٪

** الفارق المعنوي على مستوى ١٪

Nodule Weight. Analysed data for nodule-weight indicate that trifluralin decreased the nodule weight of chickpea plants significantly at the 5% level. This could be due to either the direct effect of trifluralin on microbial activity, or an indirect effect through its depression of root development. Similar results have been reported by Kust and Struckmeryer (4) in the case of soybeans.

In the study conducted in pots in the grennhouse, it was observed that besides heavier nodulation in inoculated plants, the non-inoculated plants also showed comparatively very weak nodulation which could be a result of unintentional contamination. Trifluralin delayed germination of the seeds, produced deformed seedlings, which later recovered after the 5-leaf stage, and depressed root development. However, trifluralin did not show any direct effect on nodulation.

It can be concluded from the results obtained that preplanting incorporation of trifluralin 1) delayed the germination of chickpea seeds, 2) suppressed the root and shoot development till 5 -leaf stage of chickpea seedlings. 3) suppressed the nodulation through either its effect directly on the rhizobial activity or by its suppressive effect on the root development.

الملخص

شاد، ر. أ. و ش. أ. شودري ١٩٨٥. فعالية التريفلورالين على الانبات والنمو وتكوين العقد البكتيرية على نبات الحمص (*Cicer arietinum* L.) مجلة وقاية النبات العربية ٣: ١٠١ ـ ١٠٣

أظهرت دراسة فعالية المبيد تريفلورالين في سهل البقاع (لبنان) أنه قد قلل من نسبة الانبات ونمو جذور وفروع نبات الحمص وذلك حتى طور الورقة الخامسة. كذلك سبب المبيد نقصاً في كمية العقد البكتيرية بنسبة ٣ بالمئة للنباتات المزروعة في الحقل في منطقة البقاع. وفي الفترة ذاتها نفذت في بيروت تجارب على نباتات الحمص المزروعة في أوعية؛ وأظهرت النتائج التطابق في تأثير المبيد تريفلورالين على هذه النباتات باستثناء عدم تأثيره على العقد البكتيرية في النبات.

المراجع

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