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Studies on Chemical Control of Weeds in Broadbean (*Vicia faba* L.)

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ABSTRACT

An investigation was made on the effect of the herbicides Balan and Treflan on weed control, nodulation, growth and yield of broadbean. Balan at 1 and 2 kg/ha significantly reduced weed density by more than 50% and increased seeds and straw of broadbean from 24 to 75%. It had no harmful effect on nodules formation.

Treflan at 0.5 kg/ha decreased weed population by 40% and increased seed and straw of bean by about 30%, whereas, Treflan at 1 kg/ha significantly reduced weeds by 65% but this was associated with significant reduction in seed and straw of bean by 28 and 41%, respectively. It also decreased nodulation.

INTRODUCTION

Information is required on chemical control of weeds in Libya. Moreover, very rare reports are available on selective herbicides as a mean of weed control in field crops commonly grown in this country. Most studies in other countries have shown Treflan (Trifluralin) and related herbicides to be effective in controlling most grass and broadleaf weeds in cotton, cereals and legumes (1,2,3,4,5,6,7,8,9,10). Responses of these field crops to the applied herbicides depended upon rate, method and time of application. High rates were harmful to germination, growth of seedling and yield when applied before planting (1,3,5,6,9). On the other hand, moderate and lower rates did not influence seedling growth and increased economic yields (2,4,7,10).

The present study was undertaken to provide information on the effect of the herbicides Treflan (∝, ∝, ∝-trifluoro-2,6-dinitro-N,N-dipropyl-P-toluidine) and Balan (N-butyl-N-ethyl-∝, ∝, ∝-trifluoro-2,6-dinitro-P-toluidine) on weed control and yield of broadbean (*Vicia faba* L.)

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MATERIALS AND METHODS

The experiment was conducted at the Faculty of Agriculture farm, Sidi misri, Tripoli. Five treatments, namely: control (no herbicide), 1 and 2 kg/ha of Balan (formulated as 1.5 lb/gallon liquid concentrate), 0.5 and 1 kg/ha of Treflan (formulated as 4 lb/gallon emulsifiable concentrate) were arranged in a complete randomized block design with 4 replicates. The herbicides were soil-incorporated into 4 × 4 m plots prior to sowing. Broadbean was planted on November 20, 1971 in rows 50 cm wide and in hills (2 seeds/hill) 30 cm apart. Plants were rainfed and supplemented with irrigation whenever needed. The experimental plots received 150 kg/ha of the compound fertilizer 12-24-12- before planting.

RESULTS AND DISCUSSION

Data on weight of green weeds harvested 10 weeks after planting, number of nodules per broadbean plants, weight of dry weed at crop harvest, weight of broadbean straw and seeds as affected by herbicides application are shown in Table 1. Table 2 summarizes percentage changes in weed growth, nodule formation on broadbean plants, straw and seed yields due to herbicide treatments compared with control.

Weed growth and density were greatly reduced by application of herbicides. In absence of herbicides, weed growth was heavy reaching 3742.2 kg/ha of green weeds 10 weeks after planting and 577.5 kg/ha of dry weeds at harvest time. Balan at 1 and 2 kg/ha significantly reduced weed population at 10 weeks after planting by 56 and 53%, and at harvest time by 64 and 55%, respectively. Significant reductions in green weed population of 51 and 65% 10 weeks after planting, and in dry weight at harvest time of 42 and 65% were observed when Treflan was applied at 0.5 and 1 kg/ha. From these findings, it appears that both Balan and Treflan as preplanting herbicides are effective in controlling most of weeds in broadbean when applied at moderate rates.

Nodule formation on roots of broadbean plants was significantly increased by 33% over the control when Balan was applied at 2 kg/ha; whereas 1 kg of Balan/ha had no effect on nodulation. On the other hand, Treflan at 0.5 and 1 kg/ha resulted in non-significant decrease of 10 and 26% in number of nodules. Since nodulation is important for growth of broadbean, it appears more safe to recommend the use of Balan and not Treflan as a selective herbicide.

Balan at 1 and 2 kg/ha significantly increased the yield of broadbean seed by 47 and 53%, and the straw yield by 75 and 24% over the control. Treflan significantly increased both seed and straw by 29 and 32% only when applied by 0.5 kg/ha; whereas, 1 kg/ha significantly reduced seed and a straw yield by 28 and 41% as compared with the control. These results suggest that although Treflan at the rate of 1 kg/ha, was very effective in controlling weed, it was harmful to the growth and yield of broadbean. On the other hand, Balan at 1 and 2 kg/ha and Treflan at 0.5 kg/ha greatly hindered weed growth, and enhanced both growth and yield of broadbean. Therefore, it may be concluded that Balan at the tested rates is better than Treflan in controlling weeds, and increasing growth and yield of broadbean.

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Table 1 Effect of the herbicides Treflan and Balan on weed growth, straw and grain yield, and nodule formation of broadbean

Treatment	Weight of broadbean straw Kg/ha	Weight of broadbean seed Kg/ha	Weight of green weed (10 weeks after planting) Kg/ha	Weight of dry weed (at harvest time) Kg/ha	Number of nodules per broadbean plant
Control	1828.13	1802.12	3742.5	577.5	42
1 kg Balan per ha	3203.13	2640.63	1655.3	210.0	42
2 kg Balan per ha	2265.63	2765.63	1742.8	257.5	56
0.5 kg Treflan per ha	2408.56	2303.13	1842.4	332.5	38
1 kg Treflan per ha	1078.13	1296.88	1312.3	205.0	31
LSD at 5%	418	460	820	132	13

Table 2 Percentage change in weed growth, yield and nodule formation of broadbean plants as affected by the herbicides Treflan and Balan

Treatment compared	Weight of broadbean straw	Weight of broadbean seed	Weight of green weeds (10 weeks after planting)	Weight of dry weeds (at harvest time)	Number of nodules on broadbean plant
$\frac{\text{1 kg Balan/ha} - \text{control}}{\text{control}} \times 100$	+75 S	+47 S	−56 S	−64 S	0
$\frac{\text{2 kg Balan/ha} - \text{control}}{\text{control}} \times 100$	+24 S	+53 S	−53 S	−55 S	+33 S
$\frac{\text{0.5 kg Treflan/ha-control}}{\text{control}} \times 100$	+32 S	+29 S	−51 S	−42 S	−10 NS
$\frac{\text{1 kg Treflan/ha} - \text{control}}{\text{control}} \times 100$	−41 S	−28 S	−65 S	−65 S	−26 NS

\+ = Increase
− = Decrease
S = Significant
NS = Non significant

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دراسات علي المقاومة الكيماوية للحشائش في محصول الفول البلدى

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المستخلص

درس تأثير مبيدى الحشائش « بالان ، تريفلان » على مقاومة الحشائش وتكوين العقد البكتيرية والنمو والمحصول في الفول البلدي . وتتلخص النتائج في الآتي :–

١ – نقصت معنويا كثافة الحشائش عند اضافة المبيد « بالان » بمعدلي ١ ، ٢ كجم / هكتار بنسبة تزيد عن ٥٠ ٪ . وأدت هذه الاضافة أيضا إلى زيادة في محصول الفول من البذور والقش تراوحت بين ٢٤ ، ٧٥ ٪ ولم تحدث أي تأثير ضار على تكوين العقد .

٢ – أدت إضافة المبيد « تريفلان » بمعدل ٥ر٠ كجم / هكتار إلى نقص كثافة الحشائش معنويا بنسبة ٦٥ ٪ إلا أنه قد صاحب هذا انخفاض معنوي في محصول الفول من البذور والقش بنسبتى ٢٨ ، ٤١ ٪ على التوالي ، كما انخفض تكوين العقد .