Indian Journal of Weed Science **47**(4): 397–400, 2015

Control of Italian ryegrass by pre- and post-emergence herbicides in barley

Khalid S. Alshallash*
College of Sciences, Shaqra University, Saudi Arabia 11911

Received: 14 November 2015; Revised: 23 December 2015

ABSTRACT

In two glasshouse experiments, range of herbicides was applied as pre- or post-emergence to examine their effect in controlling Italian ryegrass (*Loluim multiflorum*) grown with barley. In experiment 1, treatment by one of the three herbicides named, chlorotoluron, controlled Italian ryegrass (*L. multiflorum)* \significantly (P<0.01). However, the three herbicides differed significantly (P<0.05) in their dose. Chlorotoluron gave effective control of *L. multiflorum* at dose of 2 kg/ha with less than 10% of mean of ryegrass plants/pot survived and only a slight damage on barley was observed. Isoproturon and methabenzthiazuron were less effective in controlling the weed as more than 30% of *L. multiflorum* plants survived at different doses applied while barley plants were not affected significantly by the chemicals. In experiment 2, two herbicides diclofop-methyl or pendimethalin were applied as post-emergence treatment. The herbicide diclofop-methyl achieved an effective control of Italian ryegrass associated with barley even at rates as low as 0.25 kg/ha. Mean of ryegrass numbers and fresh weight (20 plants)/pot were decreased significantly and only few plants of *L. multifloruim* survived at 1 kg/ha, however, they were very small in size and badly damaged. Barley plants were not damaged by diclofop-methyl treatments at all applied doses. Pendimethalin created a significant effect (P=0.05) on ryegrass numbers/pot or fresh weight (20 plants/pot) at doses, 0.125 or 0.25 kg/ha. However, at 1 kg/ha there was about 40% reduction in weed numbers/pot and its fresh weight (20 plants/pot), which indicate low control effect of this chemical. There was no evidence of damage to barley plants by pendimethalin at all tested rates.

Key words: Barley, Italian ryegrass, Pre- and post-emergence herbicides

Barley (*Hordeum vulgare*) is one of the oldest cultivated cereal grains in the world (Baik and Ullrich 2008). It is called the founder crop of old world Neolithic food production and one of the earliest domesticated crops. It is considered to be the main cereals of the Mediterranean belt of agriculture (Zohary and Hopf 2000, Zohary *et al.* 2012). Italian ryegrass (*Lolium multiflorum)* is one of the most troublesome weeds in winter wheat production (Nandula *et al*. 2007). It is a herbaceous annual, biennial or perennial grass that is grown for silage or as a cover crop. It is also grown as an annual lawn grass and ornamental grass (Fransen 1994). It readily naturalizes in temperate climates and can become a noxious weed in agricultural areas or an invasive species in native habitats.

Manual weeding is labor intensive and possible only on small scale while, mechanical weed control is possible in row cropping and leaves intra row weeds. Herbicides offer the most practical, effective and economical means of reducing early weed competition and crop production losses (Worthing 1991, Troxler *et al.* 2002, Brecke and Stephenson 2006).

***Corresponding author:** kalshallash@su.edu.sa

Therefore, present study was undertaken the find out the suitable pre- and post-emergence herbicides the manager for italian ryegrass.

MATERIALS AND METHODS

Two experiments were carried out in the glasshouse with temperature ranging between 14 to 20 ^{0}C. Ten cm^2 pots were filled with John Innes No. 1 compost. Fifty seeds/pot of *Lolium multiform* were sown on the surface and 10 seeds/pot of barley cv. '*Glost*' were sown at 2 cm deep. In experiment 1, herbicides, methabenzthiazuron, isoprotoron and chlorotoluron were applied as pre-emergence at 5 different doses, methabenzthiazuron at 0, 1, 1.5, 2, 3 kg/ha, isoproturon 0, 0.5, 1, 1.25, 1.5 kg/ha and chlorotoluron at 0, 1.5, 2, 2.5, 3 kg/ha. The chemicals were applied three days after sowing. There were four replication of each treatment with a total of 60 pots. Observations were taken two weeks from herbicides application by counting the number of plants of *L. multiflorum* and barley and taking the fresh weight/20 plants of the weed and the crop. In experiment two, herbicides diclophop-methyl and pendimethalin were applied as a post-emergence treatment at rates of 0, 0.125, 0.25, 0.5 and 1 kg/ha.

The herbicides were applied at the two leaf stage of the crop. There were four replicates of each treatment with a total of 40 pots. Observations in experiment two were taken four weeks from herbicides application by counting the number of plants of *L. multiflorum* and barley and taking the fresh weight/20 plants of the weed and the crop. In both experiments, herbicides were sprayed with a hand sprayer and were applied inside the glasshouse in a stable weather conditions. Regular watering was given during experiments. Data were analyzed statistically in SAS program.

RESULTS AND DISCUSSION

Italian ryegrass was controlled significantly ($p<0.01$) by all of the herbicides used but the three herbicides differed significantly ($p<0.05$) in their effect. The application of chlorotoluron as a pre-emergence treatment gave effective control of *L. multiflorum* specially at dose of 2 kg/ha (Fig. 1 and 2). Only four ryegrass plants emerged out from 50 sown seeds at dose of 2 kg/ha. Slight damage on barley was observed.

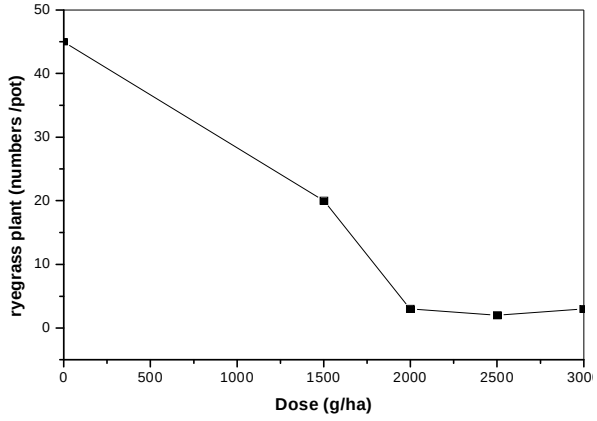

Fig. 1. Effect of chlorotoluron on annual ryegrass plants (numbers/pot)

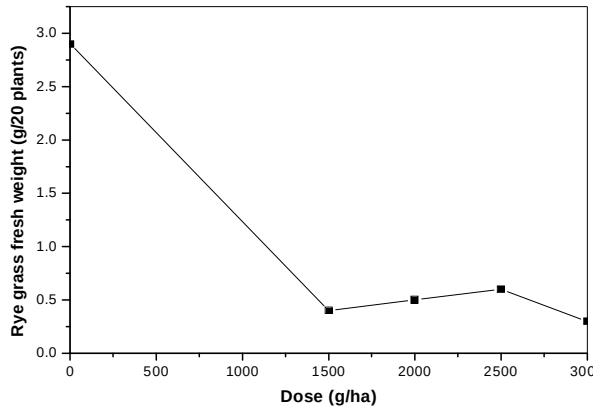

Fig. 2. Effect of chlorotoluron on annual ryegrass fresh weight (g/20 plants

Application of isoproturon as a pre-emergence herbicide gave some control to *L. multiflorum* but was less effective than the herbicide chlorotoluron as more than 30% of *L. multiflorum* seeds emerged escaping the chemical effect at different doses (Fig. 3 and 4). Barley was not affected significantly by the chemical.

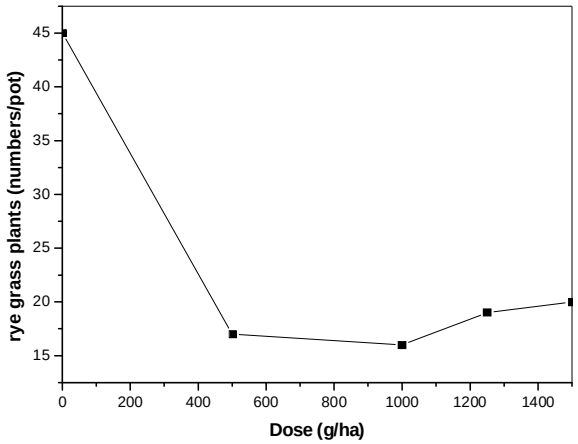

Fig. 3. Effect of isoproturon on annual ryegrass plants (numbers /pot)

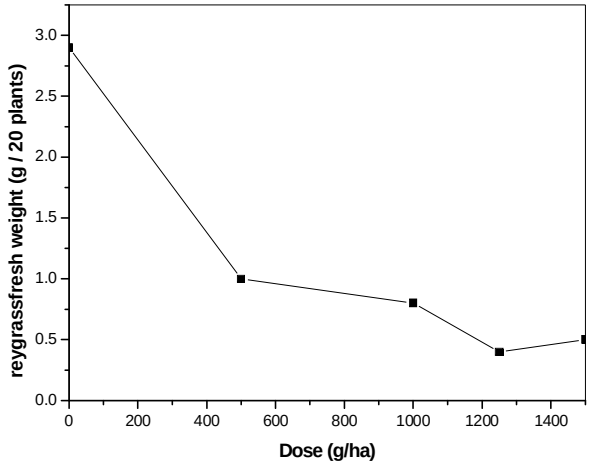

Fig. 4. Effect of isoproturon on annual ryegrass fresh weight (g/20 plants)

Application of the herbicide methabenz-thiazuron as pre-emergence treatment gave some control of *L. multiflorum* but again was less effecteve than the herbicide chlorotoluron. The most effective dose was at 2 kg/ha diallowing about 60% of *L. multiflorum* to emerge. Barley was not affected significantly again by the chemical.

Application of the herbicide diclofop-methyl as a post-emergence herbicide gave effective of *Lolium multiflorum* even at low rates. 0.25 kg/ha of the chemical as plant numbers/pot and plant fresh

weight/20 plants were decreased by about 50 % (Fig. 7 and 8). Few plants survived at dose of 1.0 kg/ha and these were very small and damaged. Barley was undamaged by any of the diclofo-methyl treatments.

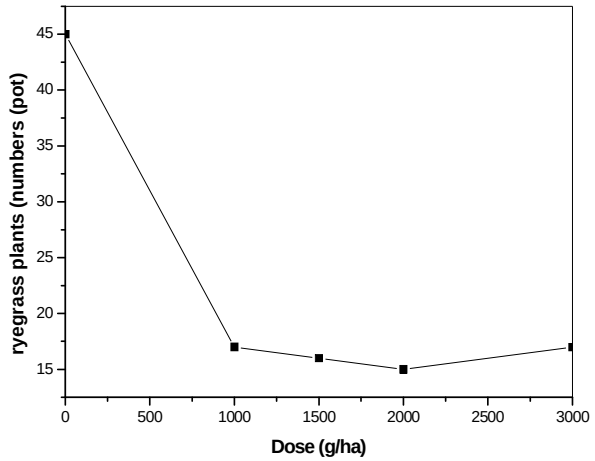

Fig. 5. Effect of methabenzthiazuron on annual ryegrass plants (numbers /pot)

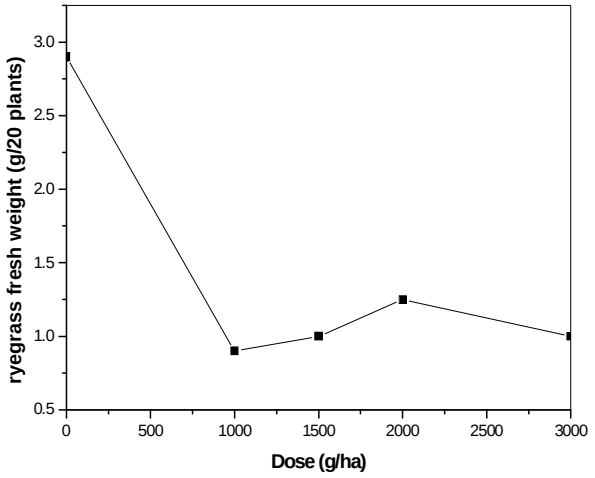

Fig.6. Effect of methabenzthiazuron on annual ryegrass fresh weight (g/20 plants)

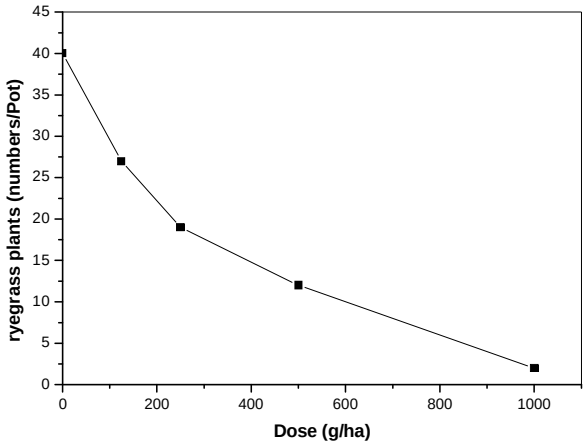

Fig. 7. Effect of diclofop-methyl on ryegrss (numbers)

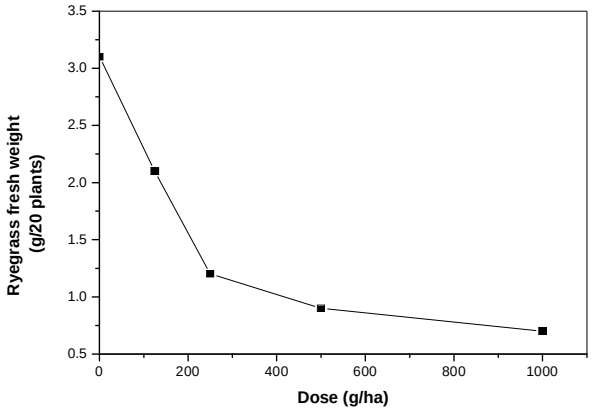

Fig. 8. Effect of diclofop-methyl on ryegrss fresh weight (g/20 plants)

Application of the chemical pendimethalin as post-emergence herbicide at 0.125 and 0.25 kg/ha had little effect on *L. multiflorum* plants numbers or fresh weight. However, at 1.0 kg/ha, there was about 50% reduction in plant numbers and plant fresh weight/20 plants (*i.e.* 75% growth reduction) (Fig. 9 and 10). There was no evidence of damage to barley by the herbicide pendimethalin at any of the tested rates.

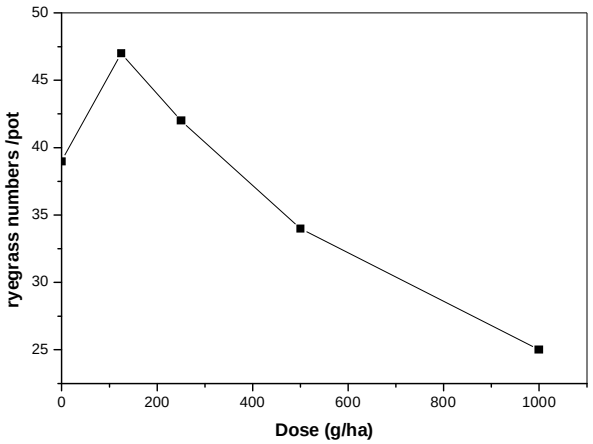

Fig. 9. Effect of pendimethalin on ryegrass numbers

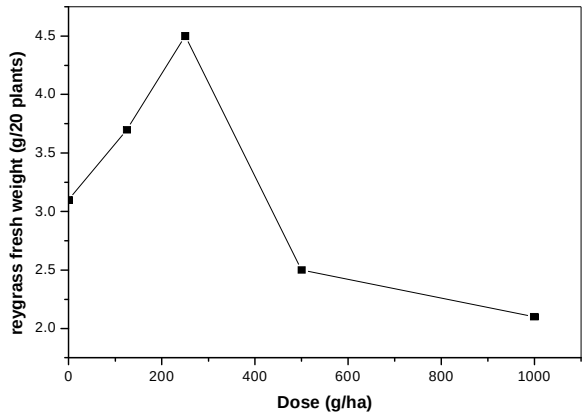

Fig. 10. Effect of pendimethalin on ryegrass fresh weight (g/20 plants)

Italian ryegrass (*Lolium multiflorum*) was controlled significantly ($p<0.01$) by the herbicides; chlorotoluron, isoproturon and methabenzthiazuron.

Application of chlorotoluron as a pre-emergence treatment gave effective control of *Lolium multiflorum* especially at dose of 2.0 kg/ha. This herbicide was also mentioned to be effective in controlling grass weeds in cereals (Saghir 1977). Tag-El-Din *et al.* (1989) reported excellent control of weeds associated with wheat at dose of 2.5 kg/ha of chlorotoluron when applied as post-emergence treatment. However, they reported sever symptoms affected wheat growth and yield. Slight effect of the chemical was seen on barley which suggest the better use of this chemical as pre-emergence treatment. When isoproturon was applied as a pre-emergence herbicide, it gave some control to *L. multiflorum* but was less effective than chlorotoluron as more than 30% of *L. multiflorum* seeds emerged escaping the chemical effect at different doses. Barley was not affected significantly by the chemical. It was reported to control other grass weeds such as sterile oat (*Avena sterllis*) but was less effective in controlling *Lolium* spp. (Ponce and Senas 2006).

Application of the herbicide methaben-zthiazuron as pre-emergence treatment gave some control of *L. multiflorum* but again was less effective than the herbicide chlorotoluron. The most effective dose was at 2.0 kg/ha preventing about 60% of *L. multiflorum* to emerge. Barley was not affected significantly again by the chemical. Methabenz-thiazuron gave good weed control in potato fields when applied as a pre-emergence treatment at 1-1.5 kg/ha resulting in a higher crop yield (Maliwal and Jain, 1991). Similar result was achieved by the application of methabenzthiazuron as pre-emergence treatment in pea field (Sandhu *et al.* 1980).

The application of the herbicide diclofop-methyl as a post-emergence herbicide gave effective control of *L. multiflorum* even at low rates. At 0.25 kg/ha, plant numbers/pot and plant fresh weight/20 plants were decreased by about 50%. Few plants survived at dose of 1.0 kg/ha. Barley was undamaged by any of the diclofo-methyl treatments. Good control of *Lolium* spp in wheat by diclofo-methyl at rates ranging from 0.375 to 1.5 kg/ha has been reported Khodayari *et al.* 1983, Tag-El-Din *et al.* (1989).

REFERENCES

Baik BK and Ullrich SE. 2008. Barley for food: characteristics improvement and renewed interest. *Journal of Cereal Science* **48**: 233–242.

Brecke BJ and Stephenson DO. 2006. Weed control in cotton (*Gossypium hirsutum* L.) with post-emergence applications of trifloxysulfuron-sodium. *Weed Technology* **20**(2): 377-383.

Fransen SC. 1994. Forage yield and quality of ryegrass with intensive harvesting. *Agronomy Abstract* 194.

Maliwal PL and Jain GL. 1991. Efficacy of fluchloralin and methabenzthiazuron for selective control in potato. *Indian Journal of Agronomy* **36**(2): 258-260.

Nandula VK, Poston DH, Eubank TW, Koger CH and Reddy KN. 2007. Differential response to glyphosate in Italian ryegrass (*Lolium multiflorum*) populations from Mississippi. *Weed Technology* **21**: 477–482.

Saghir AR. 1977. Weed control in wheat and barley in the middle east. *International Journal of Pest Mangment* **23**(3): 282-285.

Sandhu KS, Kolar JS and Brar JS. 1980. Effeciency of different herbicides for weed control in peas. *Tropical Pest Management* **26**(4): 427-429.

Spliid NH and Køppen B**.** 1998. Occurrence of pesticides in Danish shallow ground water. *Chemosphere* **37**: 1307–1316.

Tag-ElDin A, Ghandorah MO, AlRajhi D and Menecsy F. 1989. Evaluation of herbicides for weed control in irrigated wheat in Saudi Arabia. *Tropical Pest Management* **35**(3): 321-325.

Zohary, D., Hopf, M. and Weiss, E. 2012. *Domestication of Plants in the Old World: The Origin and Spread of Domesticated Plants in Southwest Asia, Europe, and the Mediterranean Basin*. 4th ed. Oxford: Oxford University Press.