

WEED MANAGEMENT IN PEAS (*PISUM SATIVUM* L.) - A REVIEW

Guriqbal Singh

Department of Plant Breeding,
Punjab Agricultural University, Ludhiana - 141 004, India

ABSTRACT

Weeds compete with the crop plants for nutrients, moisture, light and space and thus reduce crop yields. For getting higher yields it is essential to control weeds at appropriate time with suitable methods. This review discusses weed management in pea crop. Major weeds associated with this crop, losses caused by weeds, nutrient removal by weeds, crop-weed competition and methods of weed control are covered in this review.

Weeds are unwanted and undesirable plants which interfere with the utilization of land and water resources (Rao, 1987). They compete with the crop plants for nutrients, moisture, and light and thus, reduce the yield considerably. In the absence of effective weed control, yields decline and this reduction in yield depends upon the weed species and the quantum of weed flora. To get higher yield it is essential to control weeds with suitable methods at appropriate time. Here an attempt has been made to review the recent literature on weed management in peas (*Pisum sativum* L.). Earlier published reviews on integrated weed management in pulses (Singh, 1993) and vegetable crops (Singh *et al.*, 1993) also cover some weed control aspects in peas.

Pea is one of the important grain legumes grown in various parts of the world. There are two types of peas based on the stage of harvest and final consumption - dry peas and green peas. Dry peas, also known as combining peas, are those which are harvested when fully mature. Green peas are harvested at immature stage of development, in 1994 dry peas were sown on an area of 8060 thousand hectares in the world with total production of 14529 thousand metric tonnes (FAO, 1994). In the same year the world figures for area and production of green peas were 742 thousand hectares and 4346 thousand metric tonnes, respectively. France, Russia, Ukraine, China, Canada, India, Denmark, Australia and Hungary are the major pea

producing countries in the world. Area and production of dry peas is about 11.6% and 24.8% of the total area and production of all grain legumes in the world.

Weeds in pea crop: Several types of weeds are associated with peas. The most important weeds of pea crop are listed in Table 1. The magnitude of weed problem in any crop varies with the agro-ecological conditions and the level of management (Singh, 1993). Weeds in fertile and irrigated fields can, thus, be quite different than those growing in less fertile and unirrigated soils.

Table 1. Important weeds associated with pea crop

<i>Anagallis arvensis</i>
<i>Avena ludoviciana</i>
<i>Chenopodium album</i>
<i>Convolvulus arvensis</i>
<i>Cyperus rotundus</i>
<i>Fumaria parviflora</i>
<i>Galium aparine</i>
<i>Lepidium sativum</i>
<i>Medicago denticulata</i>
<i>Melilotus alba</i>
<i>Phalaris minor</i>
<i>Poa annua</i>
<i>Polygonum convolvulus</i>
<i>Rumex dentatus</i>
<i>Spergula arvensis</i>
<i>Stellaria media</i>
<i>Trigonella polycerata</i>

Yield losses caused by weeds:

Presence of weeds in the crop results in loss in the grain yield as well as quality. Loss in yield can vary from slight to as huge as the total

post-emergence stage. Before spraying certain post-emergence herbicides it is advisable first to go for leaf wax test.

Effective weed control and higher yields of peas with the application of pendimethalin at various doses have been observed by various researchers (Sharma and Vats, 1988, Chauhan *et al.*, 1992, Sekhon *et al.*, 1993, Tripathi *et al.*, 1993, Singh *et al.*, 1994). Sharma and Vats (1986) and Kolar and Sandhu (1989) have found methabenzthiazuron to be an effective herbicide for controlling weeds in peas and to get higher yields.

Gogoi *et al.* (1991) evaluated various herbicides for weed control in peas on sandy loam soil in India and found that the application of oxadiazon at 0.5-1.0 kg/ha and pendimethalin at 1.5 kg/ha resulted in the higher weed control efficiency (62.7-65.0 and 64.5 %, respectively) and grain yield (1170-1177 and 1196 kg/ha). The efficacy of seven herbicides (fluchloralin incorporated into the soil before sowing, pre-emergence application of terbutryne, methabenzthiazuron, linuron, pendimethalin and isoproturon, and post-emergence treatment 35 d.a.s. with diclofop-methyl), applied at 0.5-1.05 kg/ha, were tested in peas on loamy sand soil (Kundra and Gill, 1990). All herbicide treatments resulted in weed control comparable to that provided by manual weeding, 25 and 45 d.a.s., however, pea yields were lower in all herbicide treated than in hand-weeded plots.

Isoproturon at 0.98 kg/ha, methabenzthiazuron at 1.35 kg/ha and their combinations at 0.6 kg/ha with alachlor 1.25 kg/ha gave good weed control and green pod yield of peas (Saimbi *et al.*, 1990). Giltrap and Roebuck (1989) found pre-emergence treatments of 0.42 kg terbutryne + 0.98 kg terbuthylazine or 1.21 kg trietazine + 17 kg simazine or 1.33-2.00 kg/ha pendimethalin to be most effective herbicides in combining

peas.

The optimum time of herbicide application is very important to achieve better weed control. Herbicide applied at wrong time may damage the crop. Heath (1990) found that early post-emergence herbicide treatments gave relatively high levels of weed control and, on most sites, this was not reduced by delayed application. However, there was a tendency for the yields to be reduced when post-emergence treatments, particularly bentazone + MCPB, were delayed until the end of the recommended period, probably as a result of phytotoxicity. Post-emergence application of 1.44 kg bentazone + 1.50 kg MCPB, when sprayed after the recommended growth stage, both reduced crop vigour and pea yield (Giltrap and Roebuck, 1989).

Volunteer rape can be controlled by many herbicides. Both pre-emergence and early post-emergence application of imazethapyr at 0.05 kg + pendimethalin at 1 kg/ha show activity against a wide range of broad-leaved weeds, including *Galium aparine* and volunteer rape (Knott and Eke, 1989). Cyanazine + bentazone/MCPA showed potential for control of volunteer oilseed rape in peas (Garrett and Orson, 1989). Bentazone + MCPA at 0.125 kg + 63 kg/ha when rape was sown as a weed, and bentazone + cyanazine at 0.4 kg + 0.5 kg/ha when *Polygonum convolvulus*, *P. aviculare*, *Chenopodium album*, *Stellaria media* and *Viola arvensis* were naturally infested, provided 50 per cent yield increases above untreated control values of 4.2 t/ha (Rasmussen, 1992).

Fieldpea cv. Century was tolerant to imazethapyr applied as pre-emergence to a silty clay loam soil at 0.05-0.20 kg/ha (Malik and Townley-Smith, 1990). Imazethapyr at 36-69 g/ha was tested as pre-sowing incorporated, pre-emergence and post-emergence for the control of *Chenopodium album* in peas (Vencill *et al.*, 1990). Although imazethapyr caused

some injury to peas, yields were not reduced and all rates of the herbicide provided good control of *C. album*.

In some cases spin application of herbicides is better for effective weed control. Peas are usually damaged less by split application than single application of herbicides. The efficacy of split application of several herbicides was compared to single application with the same total rates (Jensen, 1992). Split application not only enhanced weed control but also resulted in less crop damage as compared to the single application.

Kudsk (1992) got marginal to substantial control of nine weed species with split application of bentazone+pendimethalin at 0.24 + 0.25 kg/ha applied twice when peas were 1-2 cm tall and 8-14 days later than single application of 0.48 + 0.50 kg. In another study he found better efficacy of cyanazine + MCPA by split application for the same total rates applied as a single treatment.

Residual effect of herbicides on succeeding peas: There was no residual effects of simazine and atrazine, applied to maize, on emergence or growth or yield of the succeeding pea crop (Gill *et al.*, 1988). Rana and Angiras

(1993) concluded that the residues of imazethapyr, applied at 150-200 g/ha to previous soybean, helped to control weeds in the following wheat+pea cropping system.

Integrated weed control: Integrated approach of weed management is always welcomed. Chemical control integrated with cultivations, rotation and hand weeding increases crop yields (Tu *et al.*, 1993). Pre-emergence application of 0.5 kg/ha pendimethalin + hand weeding (30 d.a.s.) or 0.5 kg fluchloralin as pre-sowing+hand weeding 30 d.a.s. have been found better for weed control and pea yields as compared to herbicides alone (Sharma and Vats, 1988).

Suggested future research

Though there are various methods for controlling weeds in peas, due to many advantages with herbicides their use for controlling weeds seems to be inevitable. Some herbicides used for the purpose of controlling weeds have been reported to adversely affect biological nitrogen fixation in various legumes. Research work need to be done to study the effect of various herbicides used in peas for their effect (adverse, if any) on biological nitrogen fixing capacity of peas.

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