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OCCURRENCE OF DIFFERENT WEEDS IN CANOLA: A SURVEY OF FARMERS IN DISTRICT SWAT-PAKISTAN

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ABSTRACT

A survey of farmers was conducted in District Swat to Pakistan record losses due to weeds in canola production. A total of 100 farmers from 5 villages were randomly selected and interviewed by using a structured questionnaire. Seventeen weeds were reported as problem weeds in the region. According to the survey, these weeds cause 20-30% losses in canola production. Overall, 51% of the farmers regard weeds as the most important constraint related to canola production. Almost none of the farmers control weeds chemically, 35% reported mechanical control, whereas 65% of the farmers do not control weeds. Majority of the farmers considered that infestation of canola by weeds increased over the last ten years. According to the farmers' reports, canola yield ranged from 1600-2400 kg ha^{-1}. Major weeds found in canola were Synapsis arvense, Chenopodium sp.*, Convolvulus arvensis, Rumex* sp.*, Coronopus didymus. Among parasitic weeds, Orobanche was recorded as a serious weed in canola and tobacco, causing up to 50% losses.*

Key words: Canola, weeds, broomrape, yield losses.

INTRODUCTION

Pakistan despite being an agricultural country spends a lot of foreign exchange on import of edible oil. The edible oil produced in Pakistan cannot meet the nation demand. The consumption of edible oil has increased by 9 % and production by 2.6 % annually in the last two decades in Pakistan (Anonymous, 2006). Oilseed crops contribute 21% towards national oil production (Vermorel *et al*., 1986). The area under canola was 28,000 hectares with 144,000 tons of oil seed and 52,000 tons of edible oil production in 2006 (Anonymous, 2006). The average yield of canola in Pakistan is very low as compared to other advanced countries. The main reason for low yield is water shortage and weeds (Reddi and Reddi, 1995). The yield of canola is directly propotional to water stress and weed density (Rahnema and Bakhshandeh, 2006; Hati *et al*., 2001 and Panda *et al*., 2004).

Weeds cause severe losses to our crops, the losses ranged to 200 billion rupees. The term parasitic weeds refer to those species that derive their food totally or partially from other plants, thus out-

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competing them. According to Gause's competitive exclusion principle, two species that occupy the same niche cannot survive simultaneously for ever. The more aggressive species thrives and the poor competitor vanishes. Therefore, parasitic plants must be separated from the same niche including the main crop plants. Some well-known parasitic genera are *Orobanche*, *Cuscuta*, *Striga*, and *Alectra*, as well as Mistletoes, which cause considerable losses in field crops.

The most aggressive and serious parasitic weed is *Orobanche*, the broomrape. The broomrape family comprises of 17 genera and 150 species. The genus *Orobanche* contains about 60 species of unbranched parasitic herbs without chlorophyll. The broomrapes are variable in color, ranging from yellowish brown and reddish violet to purple, blue, and orange. Weed control in canola is mostly done through chemical means (Marwat *et al*., 1993; Murawa *et al*., 1993; Singh and Singh, 1993; Khan *et al*., 1995; and Montvilas, 1995).

The parasitic broomrapes live directly on their hosts by attaching strong haustoria to their roots, penetrating the tissues, and absorbing the food gathered by the host plants for their own development. Upon germination, broomrape seed develops a small radical which penetrates a fine rootlet of the host and becomes firmly connected with it. For germination, broomrape seed requires exposure to biochemical exudates produced by the root of the host plant. *Orobanche* species grow chemotropically towards host plant's roots. As information regarding parasitic weeds lacks in Khyber Pukhtunkhwa, a survey of farmers was conducted to identify the occurrence of *Orobanche* spp. and other weeds and their impact in canola fields. In particular, the objectives of the study were (a) to find out the spread and impact of the parasitic weeds on agricultural crops and (b) to suggest suitable management strategies for the control of parasitic weeds.

MATERIALS AND METHODS

The survey was conducted during June 2006 in district Swat to assess the distribution, damage level and the concept of local farming community about the weeds particularly the parasitic weed, *Orobanche* and the management tools used by the farmers to tackle the problem so as to identify the reasonable deficiencies. The other purpose of the survey was to personally observe the problem weeds in the canola/rapeseed crop and their possible impact on it. The farmers were personally interviewed by using the questionnaire. The survey was conducted in 5 representative villages (20 farmers from each village were contacted) in district Swat. Thus, a total of 100 farmers were interviewed. The visits to the representative field of the farmers

verified the problem weed in canola/rapeseed crop. The format of the questionnaire is attached with the report (Appendix-I).

The villages included in the study area were; Qambar, Balugram, Ghuraija, Saidu Sharif and Murghuzar. The farmers responded positively to parasitic weeds' issue. During the survey personal observations were also recorded regarding the different weeds.

RESULTS AND DISCUSSION

The survey was conducted in five villages in district Swat. A total of 100 farmers were interviewed according to the questionnaires. The sample size of number of farmers in each village was selected according to the village size.

Weeds losses in canola

Different farmers reported different magnitudes of yield losses due to weeds. About 16% farmers reported 10-20% yield losses in canola, 59% of the farmers reported 21-30% losses, 19% farmers reported 31-40% losses, while 6% of the farmers reported above 40% losses due to weeds as given in Table-1.

Table-1. Weeds losses in canola in District Swat

Yield Losses (%)	Number of Respondents	Percentage (%)
10-20	16	16
21-30	59	59
31-40	19	19
>40	6	6

Weeds of canola

The major weeds that infested canola crop were reported as *Synapsis arvense, Convolvulus arvensis*, *Rumex* sp., *Coronopus didymus*, *Ranunculus* sp., *Medicago denticulata*, *Fumaria indica*, *Vicia sativa*, *Polygonum* sp., *Chenopodium* sp., *Setaria* sp., *Poa annua*, *Melilotus* sp., *Paspalum* sp., *Orobanche* sp., *Euphorbia helioscopia* and *Sisymbrium irio* as shown in Table-2.

Important constraints of canola production

The questionnaire included some constraints that may play role in yield reduction of canola. Those constraints were weeds, lack of quality seeds, agrochemicals, irrigation water and others. Fifty two percent of the farmers reported weeds as the most important constraints in canola production. Further details are given in Table-3.

Table-2. Major weeds of canola in District Swat.

Major Weeds of Canola	Number of Respondents	Percentage (%)
Synapsis arvense	63	63
Chenopodium sp.	61	61
Convolvulus arvensis	50	50
Rumex sp.	45	45
Coronopus didymus	42	42
Ranunculus sp.	36	36
Medicago denticulata	35	35
Paspalum sp.	34	34
Euphorbia helioscopia	32	32
Setaria sp.	28	28
Melilotus sp.	24	24
Vicia sativa	23	23
Polygonum sp.	20	20
Poa annua	19	19
Sisymbrium irio	17	17
***Orobanche* sp.**	**16**	**16**
Fumaria indica	15	15

Table-3. Major production constraints to Rapeseed and Mustard in District Swat.

Production Constraints	Number of Respondents	Percentage (%)
Weeds	52	52
Quality seeds	40	40
Irrigation water	36	36
Agrochemicals	18	18
Others	21	21

General observations:

1. Weed control strategy

The farmers reported only the mechanical method of weed control used by the local farming community; the main mechanical methods used for weed control are mowing with sickle, hand pulling, hoeing etc. No chemical weed control method was reported. Some farmers reported no control of weeds.

2. Weeds dynamics

The farmers were asked about the weeds infestation in the last ten years. Some of the farmers reported that weeds have increased over the past ten years in case of no crop rotation or more rains. Some of them reported decreasing trend where there is crop rotation or use of

herbicides. Some of the respondents reported that weed infestation has remained the same in the given time period. The infestation of *Orbanche* was also found in canola, however only few respondents reported its infestation and declared it as a problematic weed in canola. *Orobanche* has already been reported as a problem parasitic weed in Pakistan (Marwat *et al*., 1993).

3. Local yield of canola

Local average yield was reported as less than 1482 kg ha^{-1}, while some of the farmers reported their yield as 1605-1852 kg ha^{-1}, some reported as 1850-2100 kg ha^{-1}, while few reported 2100-2400 kg ha^{-1}.

CONCLUSION

Local farmers were unable to identify some of the most notorious weeds in their fields; thus it is suggested to arrange seminars, field days, workshops and training courses regarding weeds identification and awareness. The survey also highlighted many new weeds introductions, which according to the farmers were not present in the area before. These weeds may enter the fields of some of the most important crops. Therefore, the government should step forward to stop the entry of new weeds through legislation. In case of any new plant introduction, the weed scientists must be consulted in this process to avoid any future mishap of this kind.

Some of the farmers interviewed could not answer all the questions, but most of them gave important information due to their personal experience, not included in the questionnaire. Large-scale farmers were more technology oriented and willing to invest in yield enhancing technologies if they could be assured that this could translate in more revenue. Yet small farmers were more labour oriented and preferred mechanical weed control and hand hoeing, as they could not afford to invest in expensive technologies. It is also suggested that there should be networking information among the farmers and researchers for the exchange of information and technologies.

Moreover, farmers should be trained in farm area measurement, herbicide calculation, seeding rate and fertilizer calculations. Because of their miscalculation, farmers often damage their crops, which results in development of several misconceptions about new practices and technologies. These misconceptions prevail among the farming community and prevent the adoption of new technologies. So, it is suggested to arrange training workshops for farmers regarding measurements and calibration on field level and overcome such misconceptions which are the main bottlenecks in the way of adoption of new technologies.

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APPENDIX -A

Malakand Division
QUESTIONNAIRE

S. NO._____Village_____Date_____

1. Name of respondent_____Gender_____
   Education_____Age_____Household size _____
2. Tenure: (a) Owner (b) Owner-cum-tenant (c) Tenant (d) Lease
3. Major weeds of onion
   _____ _____ _____ _____ _____ _____
4. Major weeds of canola
   _____ _____ _____ _____ _____ _____
5. Do you grow onion/canola (brassica)? Y/N If not why_____
6. Sowing time of onion_____canola_____
7. Estimated yield onion_____canola_____
8. Crop Rotation with onion _____ with canola_____
9. Intercropping Y/N If yes, which crops_____
10. What are the major constraints related to crop production
    (a) weeds (b) quality of seeds (c) agrochemicals (d) water for irrigation
    (e) tax (f) others _____
11. Uses of weeds. Fodder/medicine/fuel/others_____
12. If weeds are a problem what are the estimated yield losses due to weeds in onion _____ canola_____
13. Do you control weeds? Y/N if yes, how _____
    Chemical/ mechanical/ Others _____
14. Which method do you consider the best _____ why _____
15. How you see the weeds problem over the past 10 years?
    Increasing / decreasing / same.
16. Do you know Jala (*Cuscuta*)/*Orobanche*. Yes/No.
17. If yes, which crops are infested _____ _____ _____ _____
18. Do you control it? Y/N if yes, how _____