



P-ISSN: 2349-8528
 E-ISSN: 2321-4902
 IJCS 2019; 7(5): 3169-3171
 © 2019 IJCS
 Received: 04-07-2019
 Accepted: 06-08-2019

Bhawana
 Doon Valley College of
 Education, Thakurpur,
 Dehradun, Uttarakhand, India

Shristi Singh
 Pacific Academy of Higher
 Education and Research
 University, Udiapur, Rajasthan,
 India

Sarita
 Sher-e-Kashmir University of
 Agricultural Sciences and
 Technology, Jammu,
 Jammu and Kashmir India

Unique Mehla
 Hemvati Nandan Bahuguna
 Garhwal University, Srinagar,
 Uttarakhand, India

Shivani Kumari
 Department of Agronomy
 SASRD, Nagaland University
 (Medizphema) Nagaland, India

Corresponding Author:
Bhawana
 Doon Valley College of
 Education, Thakurpur,
 Dehradun, Uttarakhand, India

International Journal of Chemical Studies

Studies on weed dynamics in mustard (*Brassica juncea* L.) crop under Doon valley conditions of Uttarakhand

Bhawana, Shristi Singh, Sarita, Unique Mehla and Shivani Kumari

Abstract

Weeds play an important role in the agriculture production system. They compete with main crop plant for water, nutrients, air and light resulting in poor crop growth and development. Weeds associated with mustard crop, categorized as broad leaved, narrow leaved, sedges and grassy weeds resulting in poor grain yield. Total eleven weed species were found in mustard crop field belonging to different family and genera. The experiment was conducted in *Rabi* season during the year 2018-2019. Maximum number of species belongs to broad leaved category of weeds classification. Three species were found to be grassy weeds followed with sedges. The weeds depending upon the type, density and duration of competition accounts for 23 – 70 per cent reduction in yield of mustard. Three species belongs to *Poaceae* family followed by *Chenopodiaceae*, *Compositae*, *Asteraceae*, *Convolvulaceae*, *Fabaceae*, *Polygonaceae* and *Cyperaceae*. Among the grassy weeds, *Cynodon dactylon* (L.) Pers. was the predominant weed followed by *Polypogon monspeliensis* and *Phalaris minor*. *Cyperus rotundus* L. was the only sedge present in the experimental field. Among the broadleaved weeds, *Chenopodium album* L. was the dominant one followed by *Anagallis arvensis* L., *Parthenium hysterophorus* L., *Convolvulus arvensis*, *Melilotus albam* *Vicia hirsute* and *Rumex sp.*

Keywords: Weed dynamics, mustard, broad leaved, grassy, sedges

Introduction

Mustard (*Brassica juncea* (L.) Czern & Coss.), is one of the most important oil seed crop belongs to the Brassicaceae (Cruciferae) family. It is having 338 genera and 3709 species distributed all over the world (Warwick S.I, and Al-Shehbaz I.A., 2006) [19]. In India, oilseeds form the second largest agricultural commodity after cereals, sharing 14 percent of gross cropped area and accounting for nearly 10 percent of agricultural product. Oilseed crops with an annual global production of 593.255 million metric tons during 2018-2019 (SOPA 2018-2019), being grown in countries like USA, Brazil, Argentina, China, India, Canada etc. The production of oilseed crops from 26.13 million hectare area in the world is 25.3 million tons. (Handbook of Agriculture, 2016). Rapeseed – mustard crop with an annual production of 0.95 million tons from 0.9 million hectare area with a yield 1055 kg per hectare noticed in Uttar Pradesh/ Uttarakhand (SEA 2017-18).

Weeds are undesirable on account of their competitive and allelopathic behavior and providing habitats for harmful organisms (Zaman *et al.*, 2011) [21]. Weeds compete with main crop plant for nutrients, water, light and moisture, resulting poor quality and yield of crops and increase the cost of production (Samad *et al.*, 2008) [6]. The weeds depending upon the type, density and duration of competition accounts for 23-70 per cent reduction in yield of gobhi sarson (Chopra P. and Saini J.P., 2007) [5]. It was reported that 25.8 per cent average yield reduction in Indian mustard due to weed infestation from Dholi, Muzaffarpur, Bihar on the basis of experiments conducted from 2003 to 2009 (Singh *et al.*, 2012) [7]. In order to achieve yield potential of mustard, timely weed management is very important. Weed control in mustard can be accomplished by cultural and mechanical methods which reduce the benefit cost ratio. Manual weeding is common in every state but it is expensive, labor-intensive and not able to perform at critical stage due to adverse soil and weather conditions. Before going to make any decision about a solution to a problem it is important to survey, identify and documentation of the weed diversity. The aim of present study is to understand the diversity of weeds in mustard field and classify the broad leaved, grassy and sedges weeds under Doon valley conditions.

Material and Methods

The experiment was conducted in the main field in *Rabi* season from November, 2018 to April, 2019. The association of weeds with main crop depends on the soil-plant- water relation with surroundings. Different weed flora can be found in different regions depending upon the availability of sources. In the present study different weed flora were found at particular growth stage of mustard crop. The weed flora was calculated by using square meter box. With the help of randomly thrown per square meter box, weeds were collected and then observed. Weed flora of the experimental field were collected, identified and classified under grassy, broadleaved weeds and sedges categories. Among the grassy weeds, *Cynodon dactylon* (L.) Pers. was the predominant weed followed by *Polygomon monspeliensis*, *Phalaris minor* and *Cyperus rotundus* L. was the only sedge present in the experimental field. Among the broadleaved weeds, *Chenopodium album* L. was the dominant one followed by *Anagalis arvensis*, *Parthenium hysterophorus* L., *Convolvulus arvensis*, *Melilotus alba*, *Vicia hirsute*, *Cyperus rotundus* L. and *Rumex sp.*

Identification

The collected weeds were identified on the spot and in the laboratory on the basis of their natural characters with the help of identification keys and other relevant literature.

Herbarium

Herbarium prepared by using observed weeds and stored in the herbarium section of department of Agriculture, Doon Valley College of Education, Premnagar, Dehradun.

Results and Discussion

From the table, total eleven weeds were collected which belongs to different families and different genera from the *Rabi* season of mustard field. During the period of investigation, weeds infested in mustard crop field consisted of different species including *Phalaris minor*, *Polygomon monspeliensis* and *Cynodon dactylon* of grassy, *Chenopodium album* L., *Anagalis arvensis*, *Parthenium hysterophorus* L., *Convolvulus arvensis*, *Melilotus alba*, *Vicia hirsute*, *Cyperus rotundus* L. and *Rumex sp.* of broad leaved and *Cyperus rotundus* L. of sedges group. The tabular representation is given in Table 1. Kashyap S.K. *et al.* (2017) [9] conducted field experiment at Agriculture Research Fram of BHU,

Varanasi and Uttar Pradesh. During the period of investigation, he observed monocot and dicot weeds including *Anagalis arvensis* L., *Chenopodium album* L., *Vicia sativa* L., *Parthenium hysterophorus* L., *Rumex dentatus* L., *Solanumnigrum* L., *Melilotus indica* (L.) and *Chenopodium album* was the pre dominant weed followed by *Solanum nigrum* and *Anagalis arvensis* during crop season. The various studies have been conducted on weeds flora associated with mustard crop. Some weeds classified on the basis of density, their nature, seasonal growth etc. Kumar S. *et al.* (2012) [10] confirmed the dominant weeds in mustard field *Phalaris minor* (28.2%), *Avena ludoviciana* (25.2%) and *Lolium temulentum* (19.2%) were the predominant grassy weeds. The broad-leaved weeds (*Vicia sativa*, *Coronopus didymus* and *Anagallis arvensis*) as a whole constituted 26.7% of the total weed flora. During the initial slow growth of mustard crop weeds get enough time and space for their establishment which enhance the further growth stages of mustard crop. Similar results were confined by Chopra P. and Saini JP. (2007) [5]. He observed *Avena ludoviciana* and *Phalaris minor* as the major weed flora in mustard crop in Himachal Pradesh. In India similar work has been carried by Nepalia and Jain (2000) [13], Mishra and Kurchania (2001) [11], Sharma and Thakur (2001) [16], Sharma R.P. (2001) [16], Singh *et al.* (2001) [17], Sharma and Jain (2002), Butter and Aulakh (2003) [3], Banga *et al.* (2004) [1], Yadav (2004) [1, 20], Nasir and Sultan (2004) [12], Chauhan *et al.* (2005) [4], Kumar S. *et al.* 2012 [10], Bijarnia AL. *et al.* (2017) [2], Kalita S. *et al.* (2017) [8], Kashyap S. K. *et al.* (2017) [9].

This study is based on the diversity of weeds of *Rabi* mustard crop field, which provides a preliminary data of the different category of weeds in mustard crop field. It will be helpful to students, researchers and farmers to identify, classify and proper management of crop. Further study is required for distribution and quantification of weeds for ecological management.

Conclusion

In this study it can be concluded that the mustard field was observed with different weed flora classified as grassy weeds, broad leaved weeds and sedges. The distribution of weeds vary from one place to other on the basis of soil-plant-climate relation. But there are some common crop associated weeds, which can be observed at any place. But there is need to study them, classify them and adapt proper management practice.

Table 1: Studies on weed diversity in the field of Mustard crop of *Rabi* Season

Scientific name	Common name	Local name	Family	Life cycle
Grassy weeds				
<i>Cynodon dactylon</i> (L.) Pers	Bermuda grass	Doob	Poaceae	Perennial
<i>Polygomon monspeliensis</i>	Rabbitfoot grass, foxtail grass	Lomarpunchh	Poaceae	Annual
<i>Phalaris minor</i>	Little seed canary grass	Guli danda	Poaceae	Annual
Broad leaved weeds				
<i>Chenopodium album</i> L.	Common lambsquarters	Bathua	Chenopodiaceae	Annual
<i>Anagallis arvensis</i> L.	Scarlet pimpernel	Krishnaneel	Compositae	Annual
<i>Parthenium hysterophorus</i> L.	Congress grass	Gajar ghas	Asteraceae	Perennial
<i>Convolvulus arvensis</i>	Fieldbind weed	Hirankhuri	Convolvulaceae	Annual
<i>Melilotus alba</i>	White sweet clover	Safed Ban-methi	Fabaceae	Annual or biennial legume
<i>Vicia hirsuta</i>	Tiny vetch	Jhunjhuni ankari, Masuri, Munmuna	Fabaceae	Annual
<i>Rumex sp</i>	Toothed dock	Chukkah	Plygonaceae	Perennial
Sedges				
<i>Cyperus rotundus</i> L	Purple nutsedge	Motha	Cyperaceae	Perennial

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