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Weed Flora in Mustard- A review

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Abstract
Among all other oil seed crops mustard is the most important oil seed crop. They play wide role in economy of India. The productivity of mustard is reduced by various biotic and abiotic factors. The weed is one of the major factor to decline the productivity of mustard. The yield losses in mustard upto 45% caused by weeds. Weed flora is the life of plant that is related to weeds and they differ from place to place. The weed flora involve the population of both dicot and monocot weeds. The dicot species are more present than monocot species in mustard. The *Chenopodium album, Melilotus indica, Anagallis arvensis, Cirsium arvense, Fumaria parviflora, Cornopus didymus, Phalaris minor, Rumex denticulatus, Vicia sativa, Carthamus oxycantha, Chenopodium murale, Avena ludoviciana, Medicago denticulatus* etc. weeds are mostly present in mustard field. Weed flora related with soil characteristics, region, climate, cropping pattern and management factors. The weeds are noxious plant and compete with crop for wetness, light, space, nutrition supplements and reduce the quality and yield attributes of crops.

Keywords: weed flora, mustard, species, dicot, monocot

Introduction
Oil seed crops are the second most important class in agriculture economy after cereals. Oil seeds are rich source of vitamins, proteins, fats, carbohydrates etc. In India the area under oil seeds is 262.06 m ha, production 32.10 m ton, yield 1225 kg/ha (Annual report 2018-19). Among various type of oilseeds are present in India and Mustard is the second important oil seed crop after the groundnut (Gill *et al*. 2012) [25]. India rank second in region after China and third underway after Canada and China contribute the 21.7% of total area and 13.4% of total production in world (Kumar *et al*. 2012) [16]. During 2016-17 absolute rapeseed-mustard area and production in nation is 6.41 m ha and 6.57 m ton (Solvent extractor association of India), out of which the Rajasthan only contribute the 47%. The only Rajasthan area under mustard is 2.56 m ha, production 3.65 m ton, yield 1422 kg/ha (Directorate of economics and statistics, 2016-17). Among the seven oil seeds cultivation in India, the Brassica species only contribute the 28.6% in total oil seed production. Brassica species oil is used for salad, made for cooking and after the extraction of oil the protein rich extra material is used for animal feed purposes (Sardana *et al*. 2011) [22].

The mustard crop grown in winter season, both irrigated and rainfed conditions. In these situations the weeds are come up with crop and interfere with crop for daylight, nutrient, space, carbon-dioxide, moisture (Kalita *et al*. 2017) [14]. The word weed derived from herb and during that present time they changed to unwanted plant (Urmi *et al*. 2017) [31]. Weeds are the bothersome plants and they are perennial problem of every farmer. In India the more losses caused by weeds upto 33% come after by the insects 20%, pathogens 26%, storage pests 7%, rodents 6% and others 8% (Kalita *et al*. 2017) [14]. The crop is infested with both wide leaved weeds and grassy weeds and if not managed at proper time it might result they, decline the productivity of mustard. Weed pervasion during beginning stages of crop is one of the central point to low the harvesting efficiency of mustard and 20-30% yield decrease (Singh *et al*. 1992). In mustard the critical period for weed competition (CPWC) 20-40 days after sowing. In Indian mustard the competition with weeds during early stages of crop in rabi season first 4-6 week after sowing the crop (Chauhan *et al*. 2005) [7]. The weeds identification, different kind of weed flora, magnitude is most critical factor to decline the productivity in mustard.

Losses due to weeds in mustard: AICRP (All India co-ordinated research project on rapeseed-mustard) explained that the losses from Ludhiana 18.1% and from Varanasi 41.7% in

mustard (Anonymous, 2011) [2]. The 20-30% decline the yield in mustard-rapeseed due to weeds. The presence of weeds in mustard field were 36-42% decline the yield. The seed yield decline in mustard due to weeds of 10-58%. The 15-20% seed yield reduced by both wide leaved weeds and grassy weeds (Brar *et al*. 1991) [6].

Weed flora vary from region to region and they depend upon the type and intensity of weeds. The flora word derived from latin word means the plants of god and they grow automatically in wild or in crops. Weed flora classification on basis of morphology, they are divided into three categories mainly in mustard field (DRMR (Directorate of Rapeseed-Mustard Research), Bharatpur, 2012) [10].

- **Grassy weeds**: They have one cotyledon, thin and short leaves, parallel flowering arrangement. E.g. *Avena fatua*.
- **Broad leaved weeds**: They have wide leaves, reticulate flowering arrangement. E.g. *Chenopodium album*.
- **Sedges**: They obtain the small size seeds but in large amount and narrow leaves. E.g. *Cyperus rotundus*.

The knowledge about different weed species is important factor and is easy for the management of weeds depending upon the distribution of weeds in different locations. The weeds are managed by physical, cultural, biological, chemical methods and the use of more than two methods called integrated weed management (IWM) because the single method is not effective. Mainly in mustard the weeds are controlled by physical method (1 or 2 hand weedings) and chemical method (use of pendimethalin, trifluralin and isoproturon as pre and post emergence). A review of literature is the important feature and they concerned to current study is being introduced in this paper.

Weed flora in mustard

Brar *et al*. (1991) [6] revealed that at Ludhiana the *Trianthema monogyna, Eragrostis tenella, Chenopodium album, Acrachme racemose* were highly aggressive in toria. Kropff *et al*. (1992) showed that the weed flora present in mustard in all district. They observed that the total 29 weed species were found and 26 wide leaved weeds, 3 grassy weeds like *Melilotus indica, Convolvulus arvensis, Carthamus oxycantha, Asphodelus tenuifolinus, Chenopodium murale, Cynodon dactylon, Avena ludoviciana, Trigonella polycerata, Chenopodium album, Orobanche aegyptiaca.* Pradhan *et al*. (1993) [19] reported that weeds problematic in mustard field like *Solanum nigrum, Chenopodium album, Anagallis arvensis, Cynodon dactylon, Polygonium spp*. at West Bengal. Dixit and Gautam (1996) [8] commented that at IARI, New Delhi the weeds were dominant in mustard field *viz. Fumaria parviflora, Phalaris minor, Melilotus indica, Cynodon dactylon, Melilotus alba, Chenopodium album*. Madhavilatha *et al*. (1997) [18] examined that 40-60% dicot and monocot weed species were infested the mustard crop at Hyderabad. The most common weeds like *Digeria arvensis, Portulaca oleracea, Cyperus rotundus, Euphorbia hirta, Melilotus indica, Cynodon dactylon, Trichodesma indicum, Cleome viscosa, Parthenium hysteropus, Portulaca oleracea*. Sharma and Mishra (1997) [24] observed at Varanasi the most of wide leaved weeds were present in mustard crop like *Melilotus indica, Anagallis arvensis, Melilotus alba* and grassy weed like *Phalaris minor* and sedge *Cyperus rotundus.* Bazaya *et al*. (2004) [3] at Jammu and Kashmir observed *Vicia sativa, Medicago denticulatus, Fumaria parviflora, Anagallis arvensis, Lathyrus aphaca* weeds were present in mustard field. Sharma *et al*. (2005) [23] explained that *Melilotus alba, Chenopodium murale, Convolvulus arvensis, Chenopodium album, Asphodelus tenuifolinus* weeds were aggressive in mustard field at Haryana. Chauhan *et al*. (2005) [7] commented that the weed species like *Melilotus indica, Avena fatua, Phalaris minor, Chenopodium album, Asphodelus tenuifolinus, Cynodon dactylon, Convolvulus arvensis, Anagallis arvensis* at Gwalior in rapeseed-mustard field. The dicot weeds were more goverened than monocot weeds. Hosseini *et al*. (2006) [11] revealed that the noxious weed flora present in winter canola *Galium tricornutum, Brassica kaber, Setaria media, Chenopodium album* at Iran. Rana *et al*. (2006) [21] reported that the most commanding weed flora in mustard like *Lathyrus aphaca, Fumaria parviflora, Cirsium arvense, Chenopodium album, Cornopus didymus, Vicia sativa, Cynodon dactylon, Melilotus alba, Anagallis arvensis.* Singh *et al*. (2009) [28] showed that the *Cynodon dactylon, Anagallis arvensis, Asphodelus tenuifolinus, Chenopodium album* weed flora present in mustard field at Varanasi. Punia *et al*. (2010) [20] commented that the *Trigonella polycerata, Asphodelus tenuipholinus, Melilotus indica, Chenopodium album, Cynodon dactylon, Avena ludoviciana, Convolvulus arvensis, Carthamus oxycantha, Chenopodium murale, Orobanche aegyptiaca* weeds were infested in mustard field at Haryana. Rajab *et al*. (2011) [17] revealed that the *Avena fatua, Asperugo procumbens, Sisymbrium irio, Descurainia sophia, Rapistrum rugosum* were weeds present in canola field during study in Iran. Kumar *et al*. (2012) [16] observed that at Palampur the weeds were dominant in mustard field *viz*. grassy weeds like *Phalaris minor* (28.2%), *Lolium temulentum* (19.2%), *Avena fatua* (25.2%) and wide leaved weeds like *Anagallis arvensis, Cornopus didymus, Vicia sativa* overall constituted 26.7% of weed flora. Kalita *et al*. (2017) [14] reported that the monocot and dicot weeds were present in mustard field like *Anagallis arvensis, Convolvulus arvensis, Chenopodium album, Fumaria parviflora, Cyperus rotundus, Chenopodium murale, Asphodelus tenuifolinus, Cynodon dactylon, Melilotus indica, Phalaris minor* in Rajasthan. Bijarnia *et al*. (2017) [5] examined the weed species in mustard like *Melilotus indica, Rumex denticulatus, Asphodelus tenuifolinus, Chenopodium album, Chenopodium murale* at Bikaner. Suryavanshi *et al*. (2018) [30] observed that at Jabalpur the productivity of mustard reduce due to weeds like *Physalis minima, Medicago sativa, Sonchus arvensis, Chichorium intybus* in cropping system. Bhawana *et al*. (2019) [4] studied at Uttrakhand observed the eleven weeds were present in mustard field like *Cyperus rotundus, Cynodon dactylon, Anagallis arvensis, Melilotus alba, Rumex sp., Parthenium hysterophorus, Convolvulus arvensis, Chenopodium album, Vicia hirsute, Phalaris minor, Polypogon monspeliensis.*

Scientific name, Family, Common name of weed species present in mustard field in different regions

Scientific name	Family	Common name
Acrachme racemose	Ranunculaceae	Black bugbane
Asperugo procumbens	Boraginaceae	German-madwort
Asphodelus tenuifolinus	Liliaceae, Asphodelaceae	Onion weed, Pyazi
Avena fatua	Poaceae	Wild oat
Avena ludoviciana	Poaceae	Durieu
Anagallis arvensis	Primulaceae	Scarlet pimpernel
Brassica kaber	Cruciferae	Wild mustard
Bromus tectorum	Poaceae	Cheat grass
Cirsium arvense	Asteraceae	Creeping thistle
Convolvulus arvensis	Convolvulaceae	Field bindweed
Carthamus oxycantha	Asteraceae	Kantiari
Cleome viscose	Cleomaceae	Tick weed
Cornopus didymus	Cruciferae	Lesser swinecress
Chenopodium album	Amaranthaceae	Bathua
Chenopodium murale	Amaranthaceae	Nettle leaved goosefoot
Cyperus rotundus	Cyperaceae	Nutgrass
Cynodon dactylon	Poaceae	Bermuda grass
Chichorium intybus	Asteraceae	Coffeeweed
Descurainia Sophia	Brassicaceae	Flixweed
Digeria arvensis	Amaranthaceae	False amaranth
Eragrostis tenella	Poaceae	Lovegrass
Euphorbia hirta	Euphorbiaceae	Astma weed
Euphorbia helioscopia	Euphorbiaceae	Umbrella milkweed
Fumaria parviflora	Fumariaceae	Pitpapra
Galium tricornutum	Rubiaceae	Rough corn bedstraw
Lolium temulentum	Poaceae	Darnel ryegrass
Lathyrus aphaca	Fabaceae	Wild pea
Leptochloa spp.	Poaceae	Sprangletop
Lepidium spp.	Cruciferae	Gardencress pepperweed
Medicago denticulatus	Fabaceae	Burclover
Melilotus indica	Fabaceae	Yellow sweetclover
Melilolotus denticulatus	Fabaceae	Sweet clover
Melilotus alba	Fabaceae	Honey clover
Melilotus parviflora	Fabaceae	Common melilot
Medicago sativa	Fabaceae	Alfalfa
Orobanche aegyptiaca	Orobanchaceae	Egyptian broomrape
Phalaris minor	Poaceae	Gulli danda
Portulaca oleracea	Portulacaceae	Duckweed
Parthenium hysterophorus	Asteraceae	Famine weed
Physalis minima	Solanaceae	Gooseberry
Polypogon monspeliensis	Poaceae	Rabbitsfoot grass
Rapistrum rugosum	Cruciferae	Turnip weed
Rumex denticulatus	Polygonaceae	Toothed dock
Setaria media	Poaceae	Bristlegrass
Solanum nigrum	Solanaceae	Makoi
Sinapis ravens	Brassicaceae	Wild mustard
Sisymbrium irio	Brassicaceae	London rocket
Setaria viridis	Poaceae	Green foxtail
Sonchus arvensis	Asteraceae	Gutweed
Trianthema monogyna	Aizoaceae	Giant pigweed
Trichodesma indicum	Boraginaceae	Indian borage
Trigonella polycerata	Fabaceae	Wild fenugreek
Vicia sativa	Fabaceae	Common vetch
Vicia hirsute	Fabaceae	Hairy tare

Conclusion

It is completed by this review weed flora in mustard the involvement of weeds also cause the yield reduction and in every district, location, place, state the weed flora are different. They according to grow the climatic, environment and management conditions and they depend upon the type, intensity of weeds. The management of weeds is systematic approach and they minimize the infestation of weeds in crop. The current articles explained that the weeds are controlled when over all knowledge about the morphology, classification, distribution, description of weeds.

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