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An Overview on Major Weed Flora in Field of Mustard [*Brassica juncea* L. (Czern and Coss)] and its Composition, Impact, and Management Strategies

Kamlesh Kumar[1], *Kowsalya V[1] and Sunil Tarar[2]

[1]M.Sc. Scholar, Department of Agronomy, Sardarkrushinagar Dantiwada Agricultural University, Banaskantha, Gujarat, India

[2]Ph.D. Scholar, Department of Agricultural Extension, Sardarkrushinagar Dantiwada Agricultural University, Banaskantha, Gujarat, India

*Corresponding Author's email: kowsivelmurugan943@gmail.com

Mustard (*Brassica spp*.) is a key oilseed crop cultivated extensively across diverse agro climatic regions in India and beyond. Despite its economic importance, mustard production faces significant challenges due to the presence of diverse weed species that aggressively compete with the crop for essential resources such as sunlight, nutrients, and water. These weeds not only reduce yield but also impact crop health and quality. This review focuses on identifying the major weed species commonly found in mustard fields, evaluating their ecological and economic effects, and outlining current weed management practices. Emphasis is placed on the integration of ecological and agronomic approaches to achieve sustainable and effective weed control.

Introduction

In North and Central India, mustard is primarily grown during the *Rabi* season. If left unchecked, weed infestation in mustard's early growth stages can lower yield potential by as much as 40-60%. Mustard's modest initial growth and narrow canopy render it susceptible to weed infestation. Developing site-specific weed management strategies requires a grasp of the biology of the primary weed species.

Major Weed Flora in Mustard Fields

Broad leave Weeds	
Chenopodium album belongs to the Amaranthaceae family of flowering plants and grows quickly each year. The plant is regarded as a weed in other places, although being grown in others. Lamb's quarters, goosefoot, wild spinach, and fat-hen are common names, however some of these are also used for other species in the genus Chenopodium, which is why white goosefoot is frequently used to distinguish it.	
Argemone mexicana is a species of poppy that originated in Mexico. It is also referred to by the popular names Mexican poppy, Mexican prickly poppy, blossoming thistle. On new road cuttings or verges, it is very resistant pioneer plant that can withstand drought and poor soil. Its latex is a vivid yellow color	

Parthenium hysterophorus belongs to the Asteraceae family. Originally from the American tropics. It is regarded as one of the most dangerous and repulsive weeds. It prefers to grow in environments with low nutrition levels and is well-known for its rapid and prolific reproduction.	
***Amaranthus Spinous*:** The vascular flowering plant Amaranthus spinosus belongs to the Amaranthaceae dicot family The blooms have terminal and axillary spikes, are green, and have no petals. Female flowers are basal, and male blooms are terminal.	
Grassy Weeds	
***Dactyloctenium aegyptium*,** often known as Egyptian crowfoot grass, belongs to the Poaceae family. The plant primarily grows in moist, thick soils. Female flowers are basal, and male blooms are terminal. Long petioles alternate with oval or rhombic-ovate leaves.	
Cynodon dactylon: Cynodon comes from ancient Greek. In addition to being grown and naturalized in the New World and on mustard fields, it is indigenous to warm temperate to tropical parts of the Old World.	
Sedges	
Cyperus rotundus: They are perennial plants that can grow up to 0.5 meters deep in still or slowly flowing water. The species differ widely in size; some are merely 5 cm tall, while others can grow up to 5 meters. Papyrus sedges, umbrella sedges, flat sedges, and nut sedges are some common names. T The breeze pollinates the greenish blossoms.	

Effects of Infestation of Weeds

Weeds change the microclimate and compete for resources, which lowers mustard yield. Unchecked weed development up to 60 days after sowing (DAS) can cause a yield loss of up to 65%. *Fumaria parviflora* and *Chenopodium album* are examples of broad leave weeds that are especially harmful because they overshadow mustard seedlings by emerging and establishing early. Weeds can also harbor diseases and pests, which exacerbates their negative effects on agricultural output.

Integrated Weed Management Strategies

Cultural Methods

• Crop rotation: Legumes and summer plowing can help lower the bank of weed seeds.
• Timely Sowing: Planting early aids in the crop's establishment prior to significant weed flushes.
• Intercropping: Because of changed canopy and allelopathic interactions, linseed or chickpeas might inhibit weed development.

Mechanical and Manual Control

• Although labor-intensive, hand weeding at 20 and 40 DAS is successful.
• With a larger row spacing (30-45 cm), inter row cultivation using a hoe or wheel hoe is possible.

Chemical Control

• Pendimethalin (1.0 kg *a.i.*/ha) is used prior to emergence to control broadleaf weeds and grasses.
• When used at the appropriate stage, post-emergence applications of Clodinafop-propargyl (60 g/ha) or Imazethapyr (75 g/ha) are selective and efficient.

Biological and Ecological Approaches

• Allelopathic crop wastes, such sunflower mulch or sorghum, can be used to naturally reduce weeds.
• One new tactic under participatory breeding is the creation of competitive mustard variants.

Conclusion

Maintaining productivity and financial gains in mustard requires effective weed control. The most promising strategy is the identification of weed flora particular to a given region together with integrated techniques that combine mechanical, chemical, and cultural methods. To reduce pesticide resistance and environmental deterioration, sustainable techniques and ongoing monitoring are crucial.

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