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MORPHOLOGICAL STUDY OF WEED SPECIES FROM THE STATE OF PUNJAB, INDIA WITH PARTICULAR REFERENCES TO LEGUMES

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ABSTRACT
A total of 13 weed species belonging to family fabaceae are documented from different kharif and rabi crops during the year 2018-2021 from the state of Punjab, India. For accurate identification, morphological parameters such as habit, leaf, stem, flower, sepals, petals, inflorescence, stamens, stigma, fruit, seed etc. were studied. This study will be useful for taxonomists as an additional information about morphology of some legume species.
KEY WORDS- *weed, Punjab, flora, flower, biology*

INTRODUCTION

Fabaceae is the largest angiosperm family with about 770 genera and 19500 species (Lewis et al., 2005). According to Bhatia et al. (2023) the family represented with 179 genera and 1297 species in India and it is morphologically, physiologically and ecologically diverse family.

There are so many tools are available for identification of organisms such as morphology, cytology, palynology, phytochemistry etc. But identification of species on the basis of morphological features is easy and simple. According to Sidhu and Singh (2021 a) morphology is a unique tool for identification of plants because it is cost basic and effective in nature.

Few reports are available on floristic from the state of Punjab, India such as Bamber, 1916; Nair, 1978; Sharma, 1990; Sidhu, 1991; Kaur et al., 2017; Singh and Singh, 2019; Singh and Singh 2020; Sidhu and Singh, 2020; Sidhu and Singh 2021 a; Sidhu and Singh 2021 b Sharma, 2021; Singh, 2022; Singh and Sidhu, 2022; Singh and Sharma, 2023; Singh, 2023, Dhillon, 2024 etc. But there is no any updated information about leguminous weed from from the state of Punjab. Keeping this in view present study was planned for documentation of weed flora of the region with special references to legumes.

MATERIALS AND METHODS

Study Area

Punjab state is agricultural state of the India. It is divided into three regions. Present study was conducted in selected areas of Malwa zone (districts Bathinda, Faridkot, Fazilka, Ferozpur, Moga and Sri Muktsar Sahib) for documentation weed species. The temperature of this zone varies from 3oC to 47oC in specific areas in different seasons. The average rainfall ranges between 480 mm to 960 mm. According to the Census of 2021 the population of the state of Punjab is 30,73,7851.

Survey and Collection

Field visits have been undertaken to the study area at regular intervals in different Kharif crops (Rice, Maize, Cotton, Sorghum and Sugarcane) and Rabi crops (Wheat, Mustard, Berseem, gram and Sugarcane) in the years 2018-2021.

Morphological Study

For morphological study, about 10-15 samples has been analyzed. Morphological features such as habit, leaf (arrangement, shape, type, color and edge), stem (pubescent, trailing, erect, hairy, glabrous), flower (color, shape, size), sepals (shape, number, color, hairy, glabrous) petals (shape, number, color, nature), inflorescence, stamens (number and nature), stigma (number, nature), fruit (shape, color, glabrous, hairy), seed (shape, color, nature) etc. have been considered for characterization of species.

Identification

The collected plant specimens were identified on the basis of available literature (Stewart, 1869; Hooker, 1872-1897; Collet, 1902; Bamber, 1916; Nair, 1978; Chowdhery and Wadhwa, 1984; Sharma, 1990; Sidhu, 1991; Lewis et al., 2005; Kaur et al., 2017; Sharma, 2021; Bhatia et al., 2023) and by consulting the Herbaria, Department of Botany, Panjab University, Chandigarh, Punjabi

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University Patiala and online herbaria such as Janaki Ammal Herbarium (www.iiim.res.in), Kew Herbarium Catalogue-Kew Garden (apps.kew.org) and Botanical Survey of India Herbarium (bsi.gov.in) for identification of species.

RESULTS AND DISCUSSION

During present investigation thirteen (11 genera) weed species belonging to family fabaceae were documented from different kharif and rabi crops during the year 2018-2021 from the state of Punjab India. Various morphological features were analyzed in detail for accurate identification and authentication of species. Out of 13 species, 12 belongs to sub family papilionaceae and only one species belongs to sub family caesalpiniaceae. All genera are monotypic whereas only one genera (Indigofera) consists of three species. Lievens (1992) studied morphotaxonomic details of species of Indigofera from North America. They used morphological features such as leaf, flower, fruit and seed for differentiation of species. Wilson and Rowe (2004) considered morphological traits viz. habit, trichomes, leaves, flowers and pods for identification of 12 Indigofera species from Australia. They recorded 5 species (I. ixocarpa , I. rupicola , I. petraea, I. pilifera and I. troflora) first time from Australia.

SUB-FAMILY- PAPILIONACEAE

ALYSICARPUS Desv.

A. ovalifolius (Schumach.) Leonard.

It is an annual, erect-spreading and tall herb. Stem is cylinder, green, branched, glabrous or sparsely hairy. Leaves are alternate, elliptic or oblong, ovate to oval, green, hairy. Inflorescence terminal or leaf-opposed, long with large number of flowers. Flowers are orange to orange-red, complete, bisexual; Sepals-5, green, hairy; petals-5, papilionaceous corolla; stamens are diadelphous, stigma-1 with long curved style. Pods are long, hairy and green. Seeds are brown, slightly compressed, oblong-ellipsoid.

DESMODIUM Desv.

D. triflorum (Linn.) DC.

It is a trailing herb. Stem is branched, green and hairy. Leaves alternate, 3-foliate; leaflets obovate or obcordate, hairy. Flowers bisexual, complete; Sepals-5, green, hairy; Petals-5, unequal, purple; Stamens-10, diadelphous, anthers bithecous; Stigma-1 with curved style. Pods green, compressed, 3-5 seeded. Seeds rounded and black.

INDIGOFERA Linn.

I. hochstetteri Baker.

It is an annual, prostrate to decumbent herb. Stem is hairy, herbaceous, thick, green or light brown in color. Leaves are alternate, green, and hairy with 5-12 leaflets. Leaflets are petiolate, hairy, green, apex obtuse. Flowers are complete, bisexual and born in axillary clusters. Corolla papilionaceous, orange-red; sepals-5, free, petals-5, fused; stamens in diadelphous condition, stigma-1 with curved style. Pods are long, hairy and curved. Seeds are lanceolate, smooth and black.

I. linifolia (Linn.) Retz.

It is an annual trailing herb. Stem is herbaceous to woody, silvery white, hairy and branched. Leaves are simple, alternate and linear. Flowers are bisexual and borne in sub sessile racemes. Sepals-5, green, silvery hairy; Petals-5, unequal, bright red in color; Stamens-10, diadelphous; Stigma-1 with short and curved style. Pods globose, apiculate, hard, silvery and 1-seeded. Seeds are globose, small and black in color.

I. linnaei Ali

It is an annual, small and trailing herb. Stem is herbaceous with woody base, branched. Leaves are alternate, hairy, oblanceolate with 5-10 leaflets. Flowers bisexual with short pedicle or sessile and born in axillary spikes. Sepals-5, hairy and green. Papilionaceous corolla, petals-5, unequal and orange red in color. Stamens-10, diadelphous; Stigma-1 with short and curved style. Pods are short, 2-3 seeded, green, hairy and borne in bunches. Seeds globose, minute, black in color.

LATHYRUS Linn.

L. aphaca Linn.

It is a sub erect annual herb. Stem is green, branched and glabrous or spaesely hairy. Leaves are opposite, dark green in colour. Leaflets modified into long tendrils. Flowers are bisexual are yellow, axillary with long pedicels. Sepals-5, green glabrous to hairy. Papilionaceous corolla; petals-5 and pale yellow in color. Stamens-10 in diadelphous condition. Stigma-1 with long style. Pods are glabrous, straight or incurved, long and contains 6-8 seeds. Seed globose, usually flattish, smooth and dark purple-brown to black in color.

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MEDICAGO Linn.
M. polymorpha Linn.
It is an annual decumbent herb. Stem is glabrous, green, branched and herbaceous to woody. Leaves are 3-foliolate leaflets obovate to cordate with toothed apex. Stipules are deeply incised, glabrous or hairy on lower surface. Inflorescences contains 1-3- bisexual flowers with small peduncle. Sepals-5, green, hairy. Papilonaceous corolla, petals-5, two interior petals joined to form a keel and yellow in color. Stamens-10, diadelphous. Stigma-1 with long and curved style. Pod is spirally coiled into two to three turns with prickles and green to brown in color. Seeds are kidney shaped, smooth and yellow in color.

MELILOTUS Juss.
M. indica (Linn.) All.
It is an erect annual herb. Stem is green, branched and hairless. Leaves are inverted lance-shaped to wedge-shaped, generally sharply toothed on the broader part. Leaflets 3, obovate or oblanceolate. Frowers are bisexual borne on racemes. Sepals-5, green, hairy and forms a tube on corolla. Corolla papilionaceous, yellow; Stamens-10, diadelphous; Stigma-1, style long and curved. Pods round-oblong, glabrous to hairy, one seeded. Seeds minute, rounded and brown to black.

RHYNCHOSIA Lour.
R. minima (L.) DC.
It is an annual climber herb. Stem is smooth or velvety and green. Leaves are trifoliate and green; leaflets-3, rhombic, ovate. The lateral leaflets are oblique. Flowers bisexual with long pedicel. Sepals-5, green, hairy; Papilionaceous corolla, petals-5, unequal, yellow but upper main petal is with reddish appearance; Stamens-10, diadelphous, long filaments; Stigma-1 with long and curved style. Pods glabrous to hairy, compressed, 2-3 seeded, brown and woody. Seeds globose, shiny and brown to black in color.

SESBANIA Scop.
S. bispinosa (Jacq.) Fawcett & Rendle
It is an erect annual shrub. Stem is branched, green, and herbaceous to woody with small spines. Leaves are alternate, green; leaflets many, narrow, linear and oblong with round apex. Racemes with 4-8 flowers. Flowers bisexual, complete; Sepals-5, green, hairy; Petals-5, yellow, unequal; Stamens-10, diadelphous, anthers dithecous; Stigma-1, style long and curved. Pods long, narrowly linear and 8-18 seeded. Seeds linear long, shining, brown to black.

TEPHROSIA Pers.
T. purpuria (L.) Pers.
It is sub-erect to erect herb. Stem green, glabrous and branched. Leaves alternate, green, hairy; Leaflets 11-17, narrow, elliptic to oblanceolate, apex obtuse or retuse, mucronate, base acute, glabrous above and silky. Flowers are bisexual born in clusters. Sepals-5, green and hairy; Petals-5, purple to bluish in color; Stamens-10, diadelphous, dithecous anthers with long filaments. Stigma-1 with long and curved style. Pods slightly curved, compressed, glabrous, green and containing 4-10 seeds. Seeds globose, shiny and brown in color.

VICIA Linn.
V. sativa Linn.
It is an annual herb. Stem is decumbent-ascending, 4-angled, winged, and green in colour. Leaves are linear oblong, apex emarginate, truncate and mucronate, base obtuse. Flowers are bisexual, axillary with long pedicel. Sepals-5, green, hairy and forms a tube on the corolla. Papilionaceous corolla; petal-5, free and bluish-violet in color. Stamens-10 in diadelphous condition. Stigma-1 with long and curved style. Pods are elliptic-oblong, flat, pubescent, green and contains 6-9 seeds. Seeds are lens shaped, compressed and brown to black.

SUB-FAMILY- CAESALPINIACEAE
SENNA
S. occidentalis (L.) Link.
It is an erect herb to shrub. Stem is herbaceous to woody. Leaves are alternate, pinnate, stipulate, leaflets 3-5 pairs, opposite, short-stalked, ovate or lanceolate, base rounded, apex acute or attenuate, glabrous above. Flowers are bisexual, axillary or terminal racemes with small pedicel. Sepals-5, free, green. Petals-5, polypetalous, unequal, yellow. Stamens-10, polyandrous, 4 stamens are reduced to staminoids and sterile (3 above and 1 lower), lowest 2 stamens are long, lateral 4 stamens are medium sized. Stigma-1, hairy with short curved style. Legume are long, compressed, smooth, hard and 10-15 seeded. Seeds are ovoid, shiny and brown to black in colour.

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CONCLUSION

This is an updated information about the occurrence of legume weed species in different kharif and rabi crops from the state of Punjab India. Morphological study of any species is helpful for accurate identification of species. Therefore this information will be useful ffor taxonomists, ethnobotanists and researchers as an additional knowledge about the weed flora of the region especially legumes.

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