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PHENOTYPIC CHARACTERIZATION OF *FOENICULUM VULGARE* (FENNEL) GERMPLASM

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ABSTRACT

An experiment was conducted with sixty genotypes of fennel for phenotypic characterization of different vegetative characters such as plant height, branches per plant, primary branches per plant, secondary branches per plant, umbels per plant, umbellate per plant, seeds per umbellate, seeds per umbel and seed yield. Variability observed for quantitative traits showed high range variation for plant height, umbels per plant, umbellate per plant, seeds per umbellate, seeds per umbel and seed yield. Characterization of germplasm based on morphological parameters signifies the extent of variability present in the population and also provides needful information for selection of desirable genotypes for varietal development and also genotypes which can be conserved for unique traits. The identification keys based on morphological characters are very useful for identification of genotypes and have a pivotal role to identify genotypes in the field without any use of costly chemicals and are fairly comparable with their results.

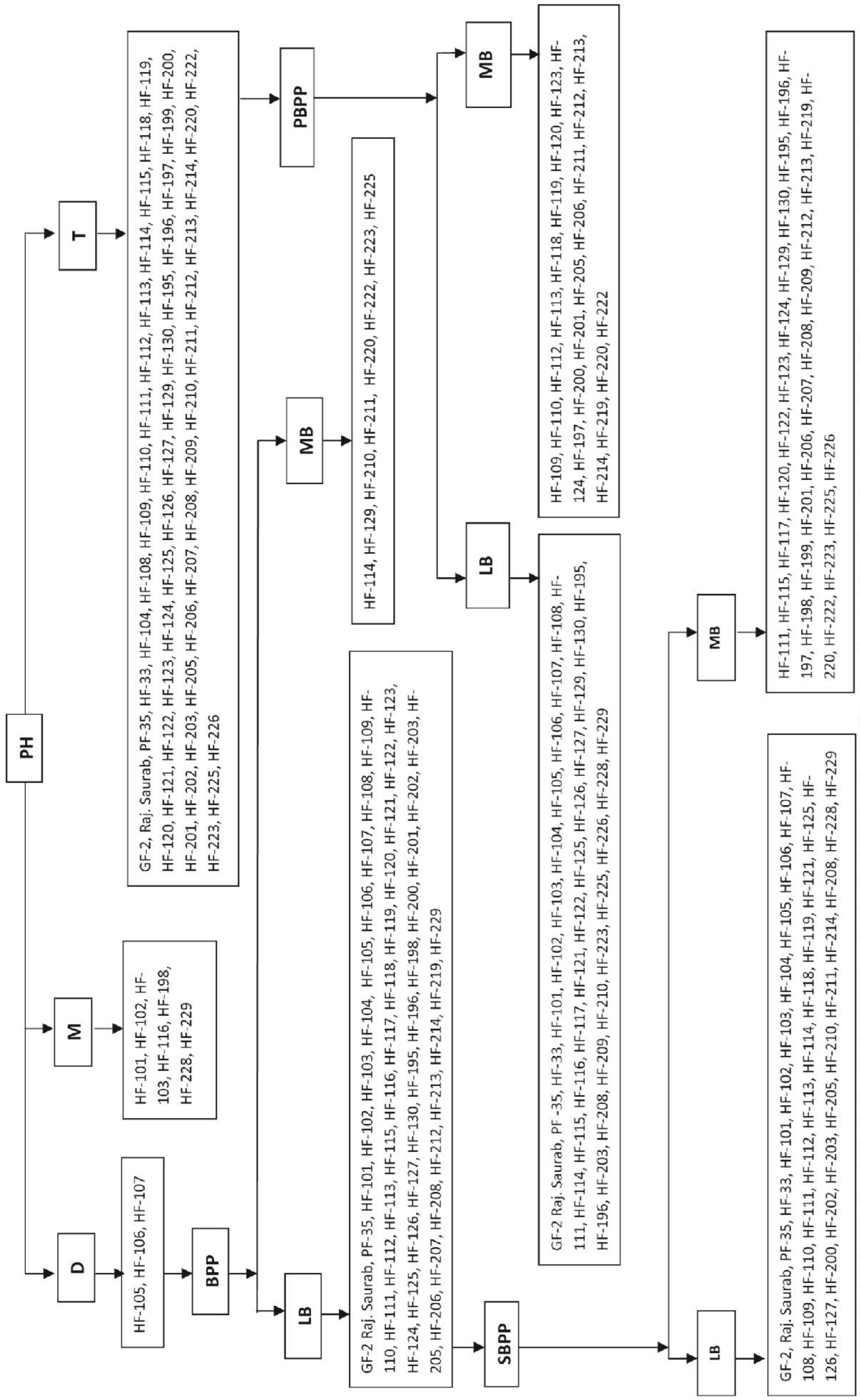
Figures : 02 References : 08 Table : 01
KEY WORDS : *Characterization, Evaluation, Identification keys, Variation*

Introduction

Fennel (*Foeniculum vulgare*) member of family Apiaceae and native to the Mediterranean region is a medicinal and an aromatic herb. It is primarily grown for its seeds. Dried fennel seeds, the aromatic, anise – flavored spices are brown or green in colour when fresh, slowly turning green to dull grey. The seeds of fennel have an active substance, which is called essential oil and most important constituent is anethole that is used in pharmaceutical, food, perfumery and flavoring industry [5,6].In North India, fennel is widely cultivated for its seeds .It grows well under dry and cold weather conditions and its cultivation has spread from Gujarat onwards to the northern parts of India. In Haryana, fennel is grown on a limited acreage as *Rabi* crop both under rain fed as well as irrigated conditions. Availability of sufficient germplasm is a basic requirement for the genetic improvement of a crop. Germplasm has a pool of desirable traits in respect to yield, quality, biotic and abiotic stress resistance. Scientists have to identify such germplasm having desirable traits. Although, good germplasm is available but its adequate characterization becomes necessary. Characterization is used to distinguish the genotypes on the basis of their highly heritable characters that help to select the most suitable genotypes according to the need of plant breeders. Therefore adequate characterization of germplasm for agronomic and morphological traits is necessary to facilitate utilization by the scientists / researchers. Genetic improvement for quantitative and qualitative traits can be achieved with a clear understanding of the nature and amount of variability present in the genetic stocks. In this study, an attempt has been made to characterize the fennel genotypes through morphological descriptors and identification key made for easily identification of variability.

Materials and Methods

The present experiment was carried out



PH = Plant Height, D= Dwarf, M= Medium, T= Tall, BPP= Branches Per Plant, LB = Less Branch, MB = More Branch, PBPP= Primary Branches per Plant, SBPP= Secondary Branches per plant

Fig.1 : Identification key based on Morphological Character for genotypes of Fennel

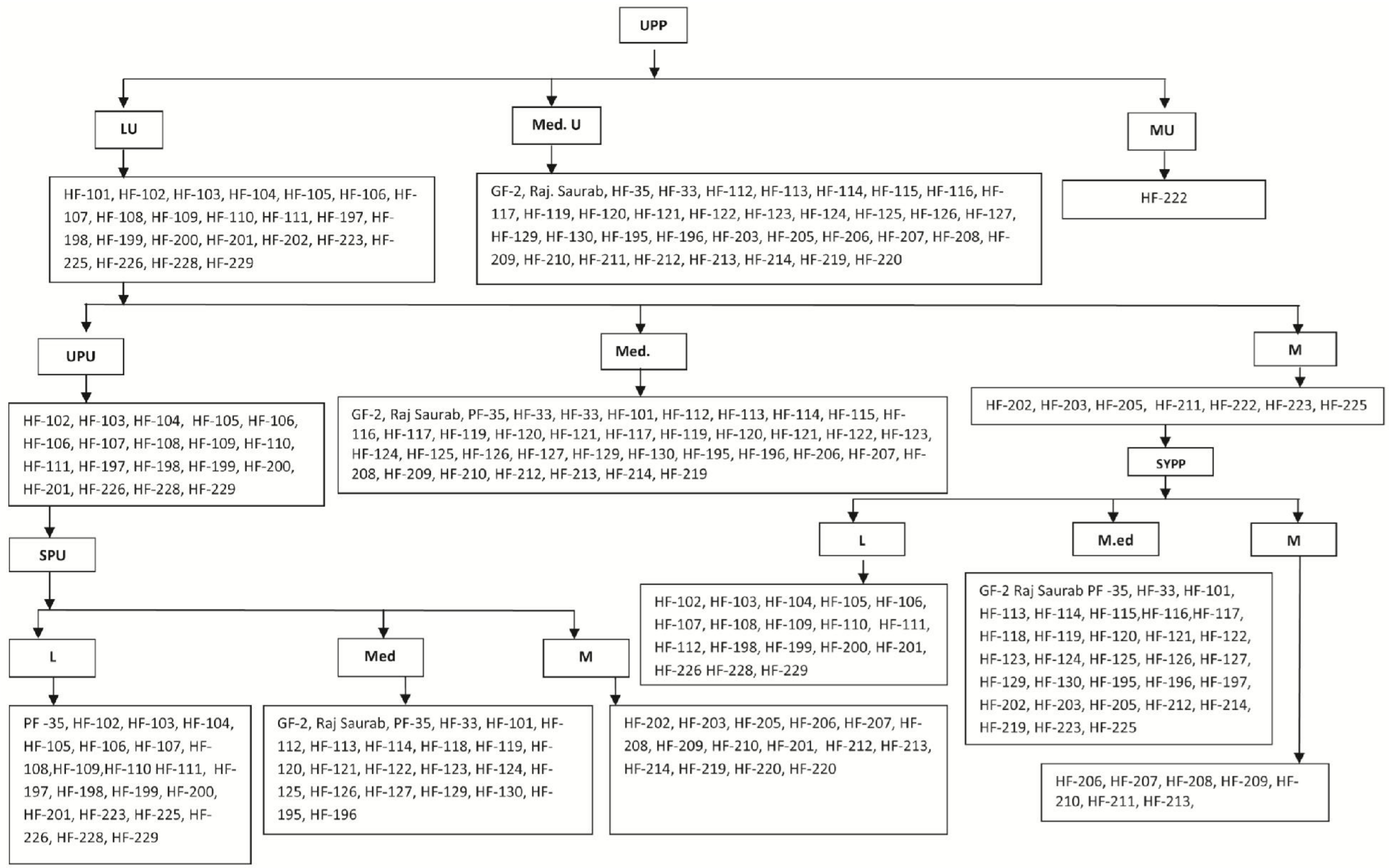
TABLE-1 : Extent of variation observed among the germplasm of fennel evaluated

Traits/Parameters	Mean	Minimum	Maximum	CV
Plant Height(cm)	153.1	101.3	186.4	0.4
Number of branches per plant	8.5	6.5	12.0	3.9
Number of primary branches per plant	9.3	4.4	14.2	3.0
Number of secondary branches per plant	25.7	18.0	35.0	1.4
Number of umbels per plants	57.4	35.1	75.5	0.55
Number of umbellate per plant	29.2	19.9	39.3	0.8
Number of seeds per umbellate	17.4	12.6	24.9	1.69
Number of Seeds per umbel	463.9	350.3	649.3	1.4
Seed yield(g)	59.1	39.3	82.0	0.5

during *Rabi* season 2015-16 at Chaudhary Charan Singh Haryana Agricultural University, Hisar. The field experimental site was located at Vegetable Science farm, Hisar that is between 29.15°N latitude 75.69°E longitudes with a mean altitude of 215 m above msl. Sixty genotypes of fennel seeds were collected from different locations of India (Gujarat, Haryana and Rajasthan).These diverse genotypes were sown (13 November 2015) in Augmented block design having four blocks with fifteen entries in each block and having plot size of 3.0 m × 1.0 m with spacing of 50 cm × 20 cm . All recommended agronomic practices were followed timely for successful raising of the crop. Randomly five competitive plants were taken to record observation on nine quantitative characters namely plant height (cm), branches per plant, primary branches per plant, secondary branches per plant, umbels per plant, umbellate per plant, seeds per umbellate, seeds per umbel and seed yield/plant (g) according to workers.[3]

Results and Discussion

The study revealed that morphological characters viz. plant height, branches per plant, primary branches per plant, secondary branches per plant, umbels per plant, umbellate per plant, seeds per umbellate, seeds per umbel and seed yield were very important diagnostic characters for varietal identification. Substantial variation and wide range has been observed among all the morphological characters (Table-1). Plant height ranged (Table-1) from 101.3-186.4 cm, number of branches per plant 6.5-12, number of primary branches per plant 4.4-14.2, number of secondary branches per plant 18-35, number of umbels per plants 35.1-75.5, number of umbellate per plant 19.9-39.3, number of seeds per umbellate 12.6-24.9, number of seeds per umbel 350.3-649.3and seed yield per plant 39.3-82g (Table-1). Similarly, in fennel some researchers[4,7] obtained the wide range for quantitative characters and find needful for selection of desirable traits. The plant height was grouped as dwarf, medium and tall, three genotypes were observed as dwarf (Fig.1), eight were observed as medium and forty nine observed as tall in height. Similarly, numbers of branches were grouped as less branches and more branches per plant Figure -1 revealed that fifty two were less branched and eight genotypes recoded more branches per plant. Similarly, some researchers[4,8] found variation in plant height and branches per plants in coriander and made classification accordingly. Number of primary and secondary branches per plant was grouped as less number of branches per plant and



UPP = Umbels per plant, LU = less Umbel, Med. U= Medium Umbel, MU= more Umbel, UPU= Umbellate per Umbel, L= Less, Med= Medium, M= more, SPU= Seeds per Umbel, SYPP = Seed Yield per Plant

Fig.2 : Identification key based on Morphological Character for genotypes of Fennel

more branches per respectively. It is found that thirty six and thirty three genotypes have less number of primary and secondary branches per plant respectively, twenty four and twenty seven genotypes were observed as more number of primary and secondary branches per plant respectively (Fig.1).These results were close conformity with observation made in faba bean (*Vicia faba* L.) and suggested that several genotypes were identified promising in the basis of morphological characterization[1]. The yield parameters provide needful information for obtaining and formulating selection strategies in fennel. Being a seed spices higher yield is important attribute in fennel and for higher yield there should be significant and positive relation between umbellate per plant, seeds per umbel and seed yield thus a wide range of variability observed in fennel genotypes (Table-1).Number of umbels per plants were grouped in three categories as less, medium and more umbels per plant, it is observed that twenty two, thirty seven and one genotype having less, medium and more umbels per plant respectively (Fig.2). The number of seeds per umbel was groped in three categories as less, medium and more umbels per plant; it is observed that twenty one, twenty four and fifteen genotypes having less, medium and more number of seeds per umbel respectively (Fig.2). Seed yield per plant was grouped in three categories as less, medium and more umbels per plant; it is observed that eighteen, thirty three and nine genotypes having less, medium and more seed yield per plant respectively (Fig.2). Some scientist[2] suggested in their finding in okra that morphological characterization is important in robust selection for breeding programme, especially yield improvement.

Conclusion

All the sixty genotypes could be differentiated from each other on the basis of morphological parameters and the information generated can be used further for the genetic improvement of fennel crop through various breeding approaches. This identification keys has a pivotal role to identify genotypes in the field without any use of costly chemicals and are fairly comparable with their results.

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