

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.711.025>

Morphological Characterization of Advanced Mutant Lines of Oat (*Avena sativa* L.)

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ABSTRACT

Keywords

Characterization,
Recurved

Article Info

Accepted:
04 October 2018
Available Online:
10 November 2018

The present study was carried out to estimate the extent of variation for qualitative traits for advanced mutant generations of oat. Observations were recorded for the different agro-morphological characters viz., plant growth habit, ligule shape, leaf blade hairiness, leaf blade hairiness, recurved flag leaves, stem width, leaf width, leaf color, panicle attitude. Characterization of accessions provides the important information about morphological and agronomical aspects of the material that is essential for gene bank management.

Introduction

Oat is one of the major cereal crops in the world. It is ranked sixth after wheat, maize, rice, barley and sorghum. The oat fodder is a major livestock feed and its grain is also used widely for human consumption, as a source of valuable nutrients. Most cultivated varieties of oat belong to an allohexaploid species with $2n=6x=42$ chromosomes originated from the aggregation of three ancestral diploid genomes AA, CC, DD (Rines *et al.*, 2006).

Oat is rich in the antioxidants α -tocotrienol, α -tocopherol, and avenanthramides, as well as total dietary fiber including the soluble fiber β -glucan (Oliver *et al.*, 2010). Assessment of the genetic variability can be achieved using morphological measurements and phenotypic characterization (Greene *et al.*, 2008) also

Arora *et al.*, (2008) carried out evaluation and characterization for some morphological traits in 554 germplasm accessions of oat.

Materials and Methods

Experimental site

The experiment was carried out under All India Coordinated Research Project on Forage Crops, Department of Genetics and Plant Breeding at Seed Breeding Farm, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P).

Experimental Material

The experimental material comprises of 115 mutant lines of oat along with three checks JO-1, JO 03-91 and Kent.

Observations recorded

Following observations were recorded at appropriate growth stages.

Agro-morphological observations

Qualitative characters were observed on single plant per plot basis and were recorded. Different categories of characters were given in Table 1.

Plant Growth habit: At juvenile stage angle of tillers from the vertical is recorded.

Ligule shape: The shape of papery membrane inside junction between leaf sheath and blade was recorded.

Leaf sheath hairiness: Hairs on lowest leaf sheath was recorded.

Leaf blade hairiness: Hairiness of leaf blade margin below flag leaf was recorded.

Recurved flag leaves: Frequency of plants with recurved leaves are recorded.

Stem width:
Stem thickness was recorded.

Leaf width: Leaf broadness was recorded.

Leaf colour: Colour of leaf was recorded

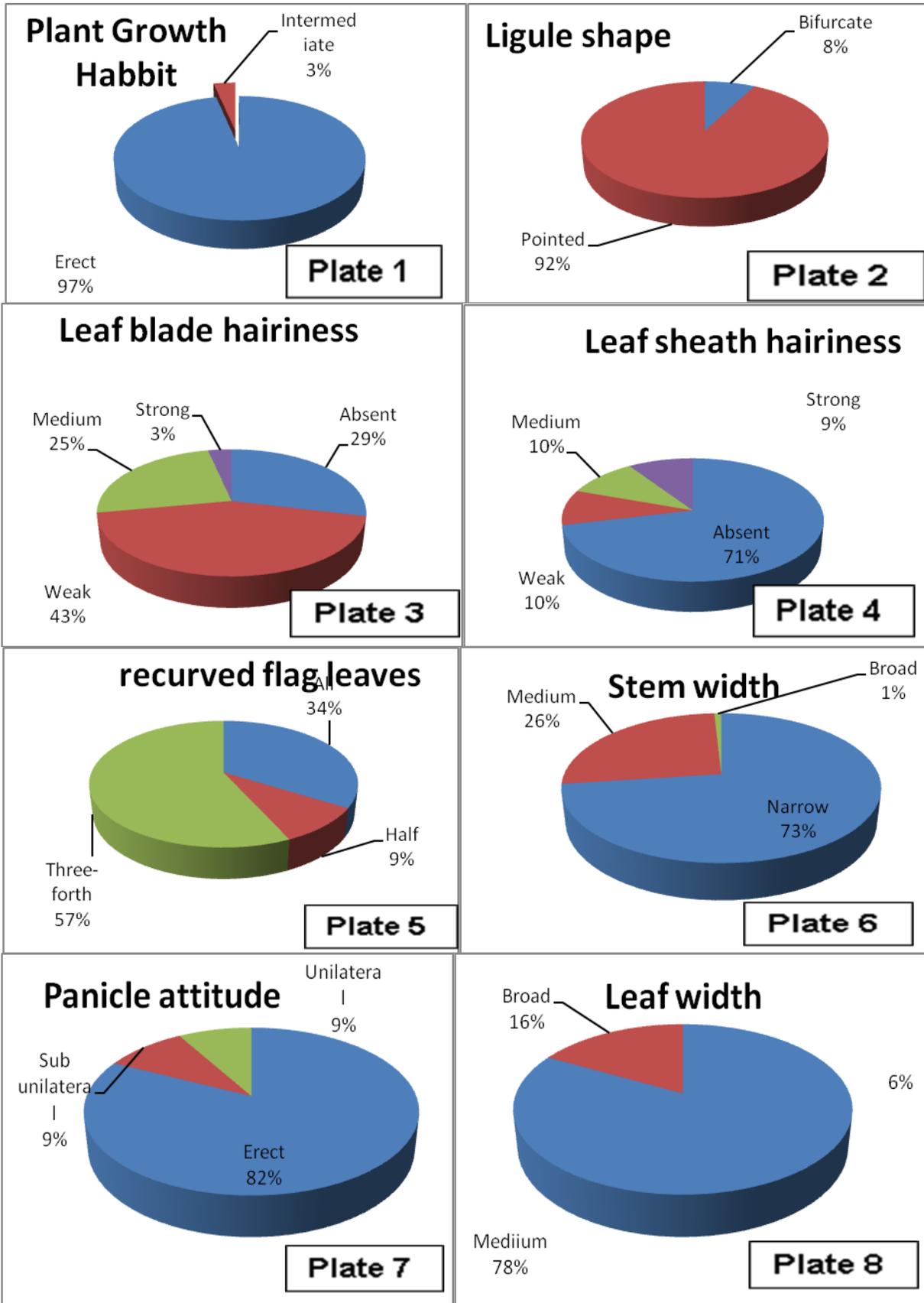
Panicle attitude: Angle of panicle from the vertical axis was recorded.

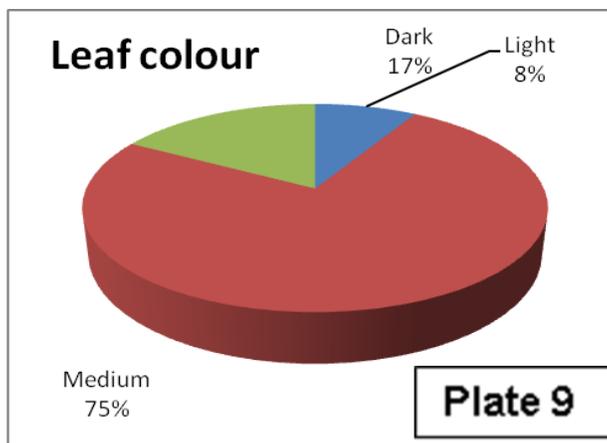
Results and Discussion

The 118 mutant oat lines including three checks were classified on the basis of morphological characters.

Table.1 Different categories of nine morphological characters

Characters	Categories or type	Symbols
1. Plant Growth habit	1. Erect 2. Intermediate 3. Prostrate	E I P
2. Ligule shape	1. Pointed 2. Broad edge	Pt Bi
3. Leaf sheath hairiness	1. Absent 2. Weak 3. Medium 4. Strong	A W M S
4. Leaf blade hairiness	1. Absent 2. Weak 3. Medium 4. Strong	Ab Wk Me St
5. Recurved flag leaf	1. All 2. Half 3. Three forth	All H TF
6. Stem width	1. Narrow 2. Medium 3. Broad	N Mi B
7. Leaf width	1. Narrow 2. Medium 3. Broad	Nr Md Br
8. Leaf colour	1. Light 2. Medium 3. Dark	L Mn D
9. Panicle attitude	1. Erect 2. Semi erect 3. Drooping	Er Ser Dr





For plant Growth habit, out of 118 lines studied, 114 lines were erect type and only 4 had intermediate type (Plate 4.1). In case of ligule shape 109 lines were grouped as pointed type of ligule and 9 lines had grouped into bifurcated type of ligule (Plate 4.2). About leaf sheath hairiness 84 lines did not have leaf sheath hairiness, 11 lines classified as weak, 12 lines denoted as medium and 11 lines had into strong lowest leaf (Plate 4.3).

For leaf blade hairiness 34 lacked the hairiness of margin below flag leaf, 51 lines grouped into weak, 29 lines classified into medium and 4 lines had strong leaf blade hairiness of margin below flag leaf (Plate 4.4). Like that for recurved flag leaf 40 lines had 100 percent frequency of recurved flag leaf, 11 lines had nearly 50 percent frequency and 67 lines had about 75 percent frequency of plants with recurved flag leaf (Plate 4.5).

For about stem width out of 118 lines studied 86 had narrow type stem, 31 were medium type and only a single mutant line possessed broad stem (Plate 4.6). For leaf width only 7 lines grouped into narrow type leaf, 92 lines had medium type leaf and 19 lines were found

to have broad leaf (Plate 4.7). In case of leaf colour 10 lines are classified into light green colour leaf, 88 lines grouped into medium green color leaf and 20 are comes under dark green color leaf (Plate 4.8). While for Panicle attitude 97 lines had erect panicle attitude type, 11 had sub unilateral type and 10 had unilateral type of panicle attitude (Plate 4.9).

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How to cite this article:

Kavita Gupta and Mehta, A.K. 2018. Morphological Characterization of Advanced Mutant Lines of Oat (*Avena sativa* L.). *Int.J.Curr.Microbiol.App.Sci.* 7(11): 209-212.
doi: <https://doi.org/10.20546/ijcm.2018.711.025>