DOI: 10.55522/jmpas.v3i6.0062 **ISSN NO. 2320 – 7418**

International peer reviewed open access journal

Journal of Medical Pharmaceutical and Allied Sciences

Journal homepage: www.jmpas.com CODEN: JMPACO

Research article

Characterization of diverse angular, owl's head and pea seed shaped germplasm of chickpea (*cicer arietinum* l.)

Priyanka Joshi*, M Yasin

Department of Genetics & Plant Breeding, R.A.K. College of Agriculture, Bhopal, Madhya Pradesh, India

Corresponding author: Priyanka Joshi, ✉ Priyanka.joshi95@yahoo.com,

Department of Genetics & Plant Breeding, R.A.K. College of Agriculture, Bhopal, Madhya Pradesh, India

Received – 20 October 2014**, Revised** – 20 November 2014, **Accepted** – 25 December 2014 **(DD-MM-YYYY)**

Refer This Article

Priyanka Joshi, M Yasin, 2014. Characterization of diverse angular, owl's head and pea seed shaped germplasm of chickpea (*cicer arietinum* l.). Journal of medical pharmaceutical and allied sciences, V 3 - I 6, Pages -236 – 238. Doi: https://doi.org/10.55522/jmpas.V3I6.00.62.

ABSTRACT

Chickpea has narrow genetic base and availability of wide spectrum of variations in qualitative and quantitative is a key factor behind a successful breeding programme to achieve desirable type as per requirement of cropping situations. Four hundred genetically diverse germplasm of Indian origin were grown in randomized complete block design with two replications and ten morphological traits were recorded and germplasm categorized as per internationally acceptable chickpea descriptor. Predominant traits in germplasm was early plant vigour, stem pigmentation, medium leaflet size, pink flower colour, semi-spreading plant growth habit, angular seed shape, smooth seed surface and single pod per node and spectrum in other traits was also recorded but in low frequencies. Variable traits can be use in recombination breeding programme. The frequencies of germplasm and their relative significance have been discussed in this study.

Keywords: Chickpea, Germplasm, Diversity, Variability, Morphological traits.

INTRODUCTION

Chickpea is a main source of protein in vegetarian population commonly known as gram or Bengal gram belongs to order Fabales, family Fabaceae and sub family Faboideae. The genus *Cicer* comprises 43 species which shares 42 wild (34 perennials and 8 annuals) and 1 cultivated species *Cicer arietinum* L. Vavilov (1926) suggested South-west Asia and Mediterranean region as the primary centre of origin and Ethiopia as the secondary centre. Breeding new plant type is possible through various breeding method but selection of new plant type and recombination depends upon diverse genetic variability. Collection, conservation and their characterization of germplasm is a regional and adoptational advantageous approach is to bring together the geographical genetic diversity, because this will combine diverse gene pool together and create new recombination of desirable gene which may produce new plant type [1].

MATERIAL AND METHOD

The present investigation was carried out during *spring* 2012-13 at research field of All India Co-ordinated Research Project on Chickpea, main centre, R.A.K. College of Agriculture, Sehore (MP). Sehore is situated in the western part of the Vindhyanchal plateau in sub-tropical zone at the 27º12' north latitude and 77º05' east longitudes at an altitude of 498.77 m above mean sea level. The soil of the field is clay loam vertisol with 52% clay, 41.3% salt and 6.6% sand with pH ranging from 7.2 to 7.8. The experimental material consisted of four hundred germplasm of chickpea were obtained from ICRISAT, NBPGR and University collection. Four hundred germplasm were grown in randomized complete block design with 2 replications during *Rabi* 2012-13. Each entry was sown in 4 meter long row with 30 cm row- to-row and 10 cm plant-to-plant spacing. Observations on morphological traits were recorded on the basis of individual lines [2].

RESULT AND DISCUSSION

The present investigation was targeted to assess variations in 10 qualitative traits used for identification of varieties and marker traits for resistant or tolerance for pod borer in diverse germplasm of chickpea.

Morphological traits: Total four hundred eighty germplasm were evaluated and their relative frequency & percentage for morphological traits were recorded. The frequency and relative frequencies of germplasm for ten morphological.

Early plant vigour

Early plant vigour was recorded in chickpea germplasm after 20 days of sowing and classified as poor, good and very good plant vigour. Maximum number of 270 (67.5%) genotypes was recorded in the good plant vigour category followed by 90 genotypes (22.5%) berried very good plant vigour whereas 40 genotypes (10.0%) were having in poor plant vigour category. Raje and Khare (1996) also found similar trend of high variation for this trait in their study on chickpea.

Stem pigmentation: Presence of anthocyanin in lower part of stem is one of the important commonly used variety identification trait in chickpea. Hence, pigmentation in stem was recorded in three categories viz., low, high and absent after 30 days of sowing. Maximum numbers of 385 genotypes (96.25%) were recorded in low pigmentation category and 8 genotypes (2%) did not show any pigmentation, while 7 genotypes (1.75%) showed high pigmentation in germplasm investigation. Robertson et al., (1997) reported absence of anthocyanin in stem of Kabuli type and its presence in Desi type chickpea. Sabaghpour et al., (2003) reported that stem pigmentation is controlled by single gene and the pigmentation is dominant over non-pigmentation in RILs of chickpea. He found monogenic inheritance pattern in stem pigmentation [3].

Leaflet size

Size of leaflets is generally varied in chickpea, In general small and medium leaflets is more common in *Desi* group and large leaflets in *Kabuli* group In the present study leaflet size was measured after 35 days of sowing and categorized as small, medium and large size. Highest numbers of 360 genotypes (90%) were observed in medium leaflet size category. Having leaflet length between 10-15mm and width 4-12mm, followed by 30 genotypes (7.5%) in small type having leaflet length less than 10mm and width less than 3mm. Small leaflet helps in low transpiration and helpful in drought tolerance. Ten genotypes recorded having large leaflet size. Singh and Tuwafe (1981), Raje and Khare (1996) and Robertson *et al.*, (1997) also reported variation in leaflet size in chickpea germplasm as has also been observed in the present study.

Plant Pubescence

Plant pubescence was measured in leaf and stem after 45 days of sowing in glabrous, light pubescence, dense and pubescence categories. All 400 genotypes were recorded pubescent. It is important to point out that collection of more germplasm is needed to include other categories of pubescence in the gene pool of chickpea for various studies.

Flower colour

There are variations in flower colour in chickpea, which varies from white, white striped, blue and pink. In general white flower is common in *kabuli* and pink in *Desi* group. In the present investigation flower colour were measured *viz.,* blue, pink, white and white-pink striped at the flowering stage of the crop. Maximum numbers of 389 genotypes (97.25%) were having pink colour flowers, followed by 10 genotypes (2.5%) having white flower colour and 1 genotype (0.25%) having white pink striped flower colour. Raje and Khare (1996) and Pundir *et al.,* (1988) reported flower colour variation as a fixed trait used for germplasm characterization [4].

Number of flowers per node

After 50% flowering, number of flowers per node was measured and classified as single, twin and multiple flowers per node types. Maximum 394 genotypes (98.5%) showed single flower per node and 6 genotypes (1.5%) were of twin flower per node recorded. In the present investigation, single flower per node is a predominant in germplasm, whereas twin flowers per node were not found in germplasm, which is also variety identification trait and associated with high productivity.

Plant growth habit

Plant growth habit varies in cultivated and wild chickpea. This is a beneficial observation for low and high plant population in an area. In the present investigation the frequency distribution of chickpea germplasm for plant growth habit, maximum numbers of 380 genotypes (95%) were recorded in semi-spreading type followed by 10 genotypes (2.5%) of spreading type, 7 genotypes (1.75%) of semi-erect type and 3 genotypes (0.75%) of erect types. Erect growth habit has been considered as best plant type, suitable for reportedmonofactorial recessive gene inherited prostrate growth habit in chickpea. Singh and Tuwafe (1981) reported erect growth habit among 3269 *Cicer* accessions [5].

Seed colour

In chickpea presence of different seed coat colour in wild and cultivated chickpea is reported in germplasm. The seed coat colour varies from black, brown, light brown, dark brown, reddish brown, greyish brown, salmon brown, grey, beige, yellow, light yellow, yellow brown, orange yellow, orange, cream, green, variegated, black brown mosaic. In this investigation seed colour was recorded after 20 days of crop harvesting and categorized as black, brown, yellow, orange and green. Highest number of 250 (62.5%) were yellow seeded genotypes followed by 90 brown seed colour genotype (22.5%) and 33 orange seed colour genotypes (8.25%), 14 green seed colour genotypes (3.5%), 10 cream seed colour genotypes (2.5%) and 3 black seed colour genotypes (0.75%) recorded amongst 400 germplasm. Rao *et al*, (1980) reported monofactorial recessive inheritance where in green seed coat colour was noticed in chickpea. Shukla and Pandya and Pundir *et a.*, (1988) reported variability in chickpea germplasm.

Seed shape

The studied germplasm were classified as angular ram's head (*Desi*), irregular rounded owl's head (*Kabuli*) and pea shaped (*Gulabi*) categories. Amongst the investigated 400 genotypes, maximum 379 genotypes (94.75%) were found in angular ram's shape type, 11 genotypes (2.759%) recorded in pea shape whereas only 10 genotypes (2.5%) showed owl's head, *kabuli* type seed shape. Maximum frequency of angular shape showed germplasm is dominated by *desi* type. Upadhyaya *et al.,* (2001) reported three types of seed shapes, which were grouped as 159 *desi* types (angular shaped), 44 *kabuli* types (owl's head- shaped) and 8 intermediate types which have pea-shaped seeds out of 211 accessions of minicore subset of chickpea.

Seed surface

Seed surface was visually recorded and classified as rough and smooth category. Maximum number of 384 genotypes (96%) showed smooth seed surface followed by 16 genotypes (4%) having rough seed surface. Rough seed surface was good for resistance to store grain pest [6, 7].

CONCLUSION

Diverse germplasm of chickpea classified on the basis of guideline given in International chickpea descriptor (1993). Various group and their relative frequency was reported in germplasm. The highest frequency in germplasm was recorded for good plant in early plant vigour; erect plant growth habit, low stem pigmentation, medium leaflet size, plant pubescence, and pink flower colour, single flower per node, yellow seed colour, angular seed shape and smooth seed surface. These traits were directly and indirectly could be utilized in the development of new plant type of chickpea.

Lowest frequency of germplasm recorded for poor early plant vigour, high stem pigmentation, large leaflet size, white pink striped flower colour, twin flower per node, black seed colour, owl's head seed shape and rough seed surface. The identified diverse traits could be utilized in recombination breeding programme for development of desirable plant type.

REFERENCES

1. Raje RS, Khare D, 1996. Effect of seed size on seed yield and seedling vigour and quality attributes of chickpea. Indian J. Pulses Res. 9(1), Pages 66-67.

2. Rao NK, Pundir RPS, Van Der Maesen LJG, 1980. Inheritance of some qualitative characters in chickpea (Cicer arietinum L.). Indian Acad. Sci. (Plant Sci.). 89(6), Pages 497-503.

3. Shah Isha, Bhatt Shailendra, Yadav Alpesh, 2014. Enhancement of solubility and dissolution of nebivolol by solid dispersion technique. Int J of Pharmacy and Pharmaceutical Sciences. 6(7), Pages 566-571.

4. Nunez F, Vranceanu AM, Ring D, 2010. Syndrome. Clinical orthopedics and related research. 468(12), Pages 3328–32. Doi: 10.1007/s11999-010-1551-x.

5. Shukla A, Pandya BP, 1988. Evolution of chickpea germplasm. Indian J. Pulses Res. 1(2), Pages 89-95.

6. Sidramappa SA, Patil PM, Salimath ST, Kajjidoni, 2008. Genetic Variation for Productivity and its Related Traits in a Recombinant Inbred Lines Population of Chickpea, Karnataka J. Agric. Sci. 21(4), Pages (488-490).

7. Upadhyaya HD, Bramel PJ, Singh S, 2001. Development of chickpea core subset using geographic distribution and quantitative traits. Crop. Sci. 41, Pages 206-210.