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Germplasm Collection and Evaluation of Hyacinth bean (Lablab purpureus (L.) Sweet.syn. Dolichus lablab L.from Akrani Tahsil, District Nandurbar

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ABSTRACT

The tribals of Nandurbar district have their own Traditional landraces of Lablab beans. Lablab beans landraces are discussed here with their morphological and ethnobotanical characters.

Keywords: Tribals, Lablab beans, ethnobotany, Akrani, Nandurbar, etc.

Introduction & Review of literature :

India is the centre of origin of wild forms of *Lablab* (Deka and Sarkar, 1990) they were introduced into Africa through South East Asia during eighth century. It is now known to be grown in many countries in the tropics. Notable among them are Australia, India, Bangladesh, Kenya, Zimbabwe, Cameron, Tanzania and other African countries, China, South and Central America and West Indies. The seeds and immature pods are used for human consumption and the herbage is used as green manure in China, Asia, India and some African countries. On the other hand, it is grown mainly as fodder crop in Australia and Central America (Cameron, 1998) the species *Dolichus lablab* was classified into two subspecies *D. lablab* var. *lignosus* and var. *dolichus*. The former is a field type with a bushy habit and is grown for seeds, while the latter is a pendal type twining in habit and is grown for it’s tender soft pods as vegetable.The collection has shown large genetic variation in pod characteristics. They opined that genetic improvement in this crop was negligible on the other hand, wild collections of species *Lablab purpureus* was divided into three sub-species by Cameron (1998). They are ssp. *purpureus,* ssp. *benghalensis* and ssp.*uncinatus* among these *benghalensis* is the pulse crop of Asiatic origin. Its pods are linear-oblong in shape. It is used in Africa as forage crop. The ssp. *purpureus* shows similar shaped pods. It is used both as pulse crop as well as commercial or green manure. The third ssp. *uncinatus* is the wild form of tropical Africa. It's pods and seeds are similar but smaller than those of ssp. *purpureus.*Shivashankar*et al.* (1981) showed that *typicus* and *lignosus* varieties of hyacinth bean are easily intercross able. Hence, they are no more considered as sub-species but only as two varieties of species *Lablab*. Lablab bean has also been reported to be having certain pharmaceutical and industrial uses. Carbohydrate and myo-inositol contents of the seed are useful for panic disorders and genistein found in the hypocotyl, it is possibly useful for menopause hot flashes (Morris, 2003). Other chemicals like lectins, alpha amylase inhibitors, vicilins are present in sufficient quantities to affect resistance to insect pests, such as *Callosobruchus maculatus*, Fabricius (Ignacimuthu*et al.*, 2000). The green pods as well as seeds are reported to show higher levels of tyrosine and leucine like amino acids than those of common bean. Its high fibre content is known to prevent cancer (Morris, 2003). Such a highly nutritive pulse crop has come as a natural food to tribals, living in an extreme tropical environment.

Methodology :

Ethno-botanical principles were followed for the collection of different landraces of crops grown by tribal people of the study area.. The criteria for the selection of these crop plants were simple, such as: (a) they are being grown from ancient times, (b) they are grown in large areas and relished and consumed by most of the tribals and (c) they are the subsistence crops of the tribals i.e. the produce is generally not sold to others. The legumes crops studied were hyacinth bean and cowpea. They were given accession numbers and field notes were recorded on farm itself. The seed samples were stored in polyethylene bags, herbarium of inflorescence twigs were prepared in cases where morpho-genetic differences were found among the landraces. The crop species collected were identified with the help of standard work of Cook (1967).

Biochemical analysis:

The content of insoluble proteins, total amino acids, free amino acids and total hydrolysable carbohydrates in the grains and seeds of the landraces of every crop were analyzed on percent of dry weight basis.

The seed material was powdered and known amount of the powder was extracted in 80 % ethyl alcohol. The supernatant fraction was used as the source of free amino acids. The residue was further extracted with Chloroform: Ether: alcohol (1:2:3) to remove lipids. The residue was then extracted with 15 % Trichloro Acetic Acid (TCA) to obtain acid soluble protein fractions. For total amino acids and total carbohydrates, the extraction procedure of Hedge and Hofreiter (1962) was followed. The powdered sample was extracted in 3.5 N HCL for 12 hours at 700C and centrifuged. The supernatant acid fraction was neutralized with Na2Co3 and used for analysis.

Spectrophotometric methods were followed for estimation of all the phytochemicals analysed. The methods of Lowry et al. (1951) for proteins, Harding and Maclean (1916) for amino acids and McCready et al. (1950) for carbohydrates were followed. The contents were estimated using BSA, methionine and glucose as standards for proteins, amino acids and carbohydrates respectively and expressed as g /100 g dry weight or percent dry weight.

Morpho-genetic characters:

For crop plants in which considerable morpho-genetic variation was observed, the landraces were grown on separate plots adjacent to the field. Characters like height, number of fruits, number of seeds / pod, 100-seed weight, pigmentation, flower colour, etc., were recorded frequently and at appropriate time during the growth and development. Besides agronomic characters like response to drought, incidence of diseases and pest etc., was also recorded.

RESULTS :-

Morpho-genetic characterictics:

A total of 9 landraces and 21 accessions were collected from different parts of Akrani tahsi of Nandurbar district Table-01 shows accession number, local name, locality, and flower colour and pod and seed characters of landraces collected. All 09 accessions are climbers. VCW-124 is more branched. The variety VCW-111 with green coloured pods is called *niyawal*. VCW-112 is called *bokadkani* due to it's pod shape similar to the ear of goat (Bokad = goat ;kani = ear in Marathi). VCW-113 is profusely branched and high yielding. VCW-114 is called *giramti*, which is more susceptible to pest.VCW-114, VCW-115 and VCW-116 are called *lalwal* due to their purple coloured pods. But they differ in the shades of colour. VCW-117 is called *hirvawal-I* due to green coloured pods. VCW-118 is also called *hirvawal-II*, but it's pods are faint green in colour and are flat and short as compared to VCW-117. The variety VCW-123 is called *mothi safed fapda.* The name *fapda* indicates the flat and broad shape of the pod.

Yield characteristics:

Table- 2 shows yield characteristics of the 9-wal landraces. The range of number of pods per inflorescence was from 1.66 to 11.3. At least five landraces showed six or more than six pods per inflorescence. The range for pod length was 6.00 to 13.8 cm and for breadth was 0.93 to 4.26 cm. Both length and breadth were maximum in VCW-112, but the characters, pods per inflorescence and seeds per pod were less in this accession. Number of seeds per pod showed a range of 2.66-6.66. Three accessions viz., VCW-113, VCW-114, VCW-123 showed six or more than six seeds per pod. The range for seed size was also narrow. The pod length was more than 10 cms in accessions VCW-114 (12 cm), VCW-113 (11.3 cm), VCW-123 (10.33 cm), VCW-111 (10.2 cm) and VCW-115 (10 cm). But pods per inflorescence were highest in VCW-114 (6.8). Seeds per pod were highest in VCW-123 (6.66) and lowest for VCW-114(4.66). The 100-seed weight showed a maximum of 71 g. in VCW-112 and a minimum of 34 g. in VCW-117. The accession VCW-114 is also a high yielding landrace with 70 g. of 100-seed weight, 6-seeds per pod and seed size of 1.47 cm. The number of pods per inflorescence for VCW-114 was however moderate at 7.66.

Seed proteins and total amino acids:

Table-3 shows the percentage of insoluble proteins and total amino acids in the dry seeds of hyacinth bean landraces. The protein content was 21.6% to 48%. The protein content of more than 40% was recorded in five cultivars viz. VCW-112, VCW-113, VCW-114, VCW-115 and VCW-116. All these five cultivars showed total amino acids in the range of 32.50 -38.50%. These five collections were from Akrani tahsil. Low protein content of 21-30% was recorded in cultivars VCW-117, and VCW-118. The highest amino acid content of 38.50% was observed in lal wal-III (VCW-116) collected from Toranmal in Akrani tahsil.

Seed morphology:

The seed morphology also shows a good variation among the 15 landraces of *hyacinth bean* as shown in Table-01.

The seed shape is mostly oblong and about eight accessions showed this type of seed. While, seed shape is round in VCW-112, VCW-113 and VCW-117. The shape of VCW-114, VCW-115 and VCW-116 is flat and oblong.

Seed colour is black in VCW-111, VCW-113, VCW-116 and VCW-117. The landraces VCW-112 and VCW-123 have brown coloured seeds. VCW-114 shows faint brown seed with black dots. VCW-115 shows faint brown seed with dark brown spots and VCW-118 shows blackish brown seed colour.

Discussion:

Extremely high variability was observed among the nine Wal landraces. There are pole type and bush type varieties, disease resistant and susceptible varieties, high protein and high total amino acid containing varieties and also vegetable and grain legume varieties. Variation was also observed in several morphological characters of pod and seed (Table 1 & 2,Such high degree of variation among the landraces of field bean crop plants indicates their adaptation to the local climatic conditions. It also suggests the methods developed by the local ethnic groups in utilizing the vast biodiversity of this legume crops to fulfil their food and nutritive requirements in a sustainable way. The tribals of this district do not grow these legume crops in field for large-scale production. There are two reasons for this - a) this legumes form only side dish in their food and b) allocation of land to legume crop will reduce the production of cereal and millet crops whose produce must be stored for the the entire year. Dikshit and Aghora (2004) observed that mostly the tribal communities are the custodians of the valuable diversity of the cowpea exhishing in Orissa. They opined that the indegeous method of indentification and maintanance of strains helped the tribals in conservation of vast biodiversity of Wal. The present study also clearly indicates that the tribals of Nandurbar have their own methods of identification and maintenance of hyacinth bean and cowpea landraces as evidenced by their local names, topographical features of area grown and limited cultivation.

The protein contents of seeds of hyacinth bean obtained in the present study are on higher side as compaired to the standard amount of 25-30 %. One of the reasons for this may be the presence of large quantity of free tyrosine amino acids in the protein sample. The aim of the present study is to establish the quality of the available landraces on the basis of comparison but not to find the precise contents of the metabolites. The results show that there is enormous variation in the protein content among the landraces of hyacinth bean . Landraces with high protein content coupled with high total amino acids levels are valuable strains for improving the nutrition quality of our HYVs in future crop improvement programme. Wal is recognized as vital for food security by the International Treaty on Plant Genetic Resources for Food and Agriculture. Thus, the collections of Wal diversity are eligible for funding by Global Crop Diversity Trust (Kapila, 2004).

The tribal farmers of Nandurbar district do not have the idea that Wal can grow very well in their soils due to it's ability to utilize nitrogen in soil atmosphere. Secondly cowpea has extremely high capacity of drought tolerance and provides green cover during severe drought conditions also. The tribals should exploit these characters by using cowpea as a mixed crop along with other drought resistant crops like millets. There must be bodies either GO or NGO to educate these marginal farmers who are rendering valuable service to our biodiversity by in situ conservation of our crop plants. Such GOs and NGOs can support traditional farming systems. They may also provide a feed back to Government to determine National Agricultural Policies particularly for scarcity areas.

Growing of grain legume crop plants for a very limited extent (restricted to kitchen garden) without bringing them into cultivation is another important findig of this work. The germplasm of these grain legumes lablab bean show a great deal of diversity in several morphogenetic agro botanical and yield characteristics . The corrlation between flower colour and succeptibility to disease pest is established for hyacinth bean germplasm.

Concluding these remarks with a quote of the great botanist, internationally renouned agricultural scientist, Dr. M. S. Swaminathan will be a befiltering fanale to this work.

Lab-to -lab: This will involve organizing a consortium of scientific institutions and data providers.

Lab-to-land: This will involve symbiotic linkages between the providers of information and the users, so that the information disseminated is relevant to the life and work of rural familes.

Land-to-lab: There is considerable traditional knowledge and wisdom among rural and tribal families concerning the sustainable management of natural resources, particularly water and biodiversity. Therefore, the technical experts should not only learn from traditional knowledge and experience, but also take steps to conserve for posterity, dying wisdom and dying crops.

Land-to-land: There is much scope for lateral learning among rural families; such learning has high credibility because the knowledge coming from a fellow farm-woman or man would have been subjected to an impact analysis from the point of view of it's economic and social relevance to the population.

"Progress in achieving a productivity revolution need not wait until new technologies become available. Integrated steps in the areas of soil health and fertility enhancement, water conservation and management, conservation and sustainable and equitable use of agro-biodiversity and greater emphasis on post-harvest technology and agro processing will help us leapfrog in agricultural progress and agrarian prosperity. Unity of goals but diversity of approaches based on local socio-cultural, socio-economic and agro ecologicalconditions will be needed so as to the desired goals.

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