Progressive Research 5 (Special) : 337-338 (Dec. 2010) *Society for Sci. Dev. in Agric. and*

COLOUR POTENTIALS OF PROMISING CHENOPODS (*CHENOPODIUM SPECIES*)

***Shri Niwas Singh[1], Sateesh Chandra Gaur[1] andd Amar Nath[2]**

[1]*Department of Genetic and Plant Breeding, B.R.D.P.G. College, Deoria-274001 (U.P.)*

[2]*Department of Chemistry, B.R.D.P.G. College, Deoria-274001 (U.P.)*

Corresponding author* ***E-mail :* *niwas_mdra@bsnl.in*

ABSTRACT

Four types of chenopods (*Chenopodium species*) were selected for fast rate of biomass accumulation. These are suitable crop ideotypes for multi-storey cropping and multiple uses. Large amount of produced biomass of these chenopods creates a problem of plenty. A red tinge in senescent and stressed leaves stimulated us to test their colour potentials so that their demand will increase. Five commonly used mordants, namely,Terminaliachebula (Harad powder), Alum ($K_2SO_4Al_2(SO_4)_3.24H_2O$), Chrome alum ($K_2SO4Cr_2(SO_4).24H_2O$), Iron (Fe) and Tin (Sn) were tested with the saps of these chenopods for developing colours. Five different shades of colours developed. These colours could be used in food, medicine and textile industries. Large scale cultivation of these plants may also help in fighting global warming and increasing food security.

Key words : *Chenopodium, Chenopods, Colour, Mordants, Global warming.*

Chenopodium is the type genus of the chenopodiaceae family of dicotyledonous angiosperms. Some of the Chenopodium species are weeds. Some others are semi-domesticated and some others are fully domesticated crop plants. We were selecting crop ideotypes from available chenopods for high biomass production on per unit area basis. Four types of crop ideotypes, viz., early, mid, late and very late were developed and found very promising. Among the above four promising types, the early one is developing red tinge throughout its shoot portion during senescence and under the conditions of water stress. Our serendipitous observation was that a red colour sap came from the leaves when they were crushed with hands. Since this colour is of biological origin and safe for human consumption and use, we thought of exploring its colouring potentials. Since this colour gets washed off from skin or clothes readily, we thought of making the colour a bit permanent with the help of mordants. Five commonly used mordants were used for this purpose.The present paper reports the findings of this experiment. Since the above mentioned promising chenopods are of multiple use, this colouring property will become an extra useful character to choose/adopt these chenopods in multi-storey cropping.

MATERIALS AND METHODS

There are about 250 species of Chenopodium reported in the world so far (Bhargava, *et. al.*, 2007; Giusti 1970). Out of these, about 21 species have been reported from India (Neerja *et. al.,* 2007). We collected about ten types of chenopods from around Deoriaand adjacent Gorakhpur district and evaluated them for the high rate of biomass production on per unit area basis. Out of these, four types were selected as very promising. The leaves of these chenopods were crushed and their sap was collected. Both the red and the green leaves/shoot were crushed and the sap was poured separately into five test-tubes. Each test-tube contained about five milliliters of sap. One gram of each of the following mordants were added to each test-tube: 1. Terminaliachebula (Harad powder), 2. Alum (aluminum potassium sulfate), 3. Iron (Ferrous Sulphate), 4. Tin (crystals) and 5. Chrome (Potassium dichromate). The test-tubes were shaken for about ten minutes. The developing colours were used to write on plain papers and these are the resulting colours. As a control experiment, the sap of chenopods alone (without any mordant) was also used to write on the plain paper and the resulting colour was compared with those developed with the help of mordants.

In another control experiment, the above mentioned mordants alone were used separately after adding them in the water to write on plain white paper. The developing colours were used for comparison.

RESULTS AND DISCUSSION

The colours developed in the above experiments are given in figure 1. These colours could be considered as results of this paper and are almost self-explanatory.

Five shades of colours developed from a single source by adding commonly used mordants separately.

Mineral mordantsare commonly used today with natural dyes. The term 'mordant' is derived from a french word meaning 'to bite' the fiber-describing how mordants were thought to work. In reality, it is still not really understood how a mordant helps dye adhere better to fiber. In early days the leaves and roots of certain plants were used for colouring. This is the case even now in India and other places where traditional dyeing methods are still carried on. An example of this is the eco-friendly Herbal Mordant from Blue Castle Fiber Arts.

Man has been using colours since time-immemorial. These colours are of various origins. Nowadays, safe and organic colours are the demand of time. In this connection, above mentioned chenopods may prove to be a good source of colours. Therefore, their colouring potentials need to be explored and tapped. Chenopods belong to the same family from which the beet root (*Beta vulgaris* L.) comes. Beta vulgaris is a well-known colouring agent which has calcium, phosphorous, iron, vitamins A and C, niacin, thiamine, and riboflavinbio-chemicals. Pigments responsible for imparting colours from both these genera may be similar. One of the mordants, used here, namely Terminaliachebula is awell-known medicinal plant in Indian system of medicines. Therefore, this mordant could be safely used along with chenopods in the food, medicine and textile industries.

Since these chenopods are very fast growing and producing a large quantity of biomass, there is a problem of plenty. Although, there are many uses of this biomass, tapping its colour potentials would increase its demand. These chenopods are C_4 plants and hence efficient in photosynthesis at higher temperatures. Large scale cultivation and full canopy cover would help fighting global warming and increasing food security.

REFERENCES

1. Bhargava Atul, Sudhir Shukla and Deepak Ohri, 2007. Genome size variation in some cultivated and wild species of Chenopodium (*Chenopodiaceae*), *Caryologia, 60(3):* 245-250.
2. Giusti, L., 1970. El generoChenopodium en Argentina 1: Numeros de cromosomas. *Darwiniana, 16:* 98-105.
3. Neerja Yadav, Neeru Vasudeva, Sumitra Singh and S.K. Sharma 2007. Medicinal properties of genus Chenopodium Linn. *Natural Product Radiance, 6(2):* 131-134.