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Characterization of Indian spinach (*Basella* spp.) genotypes under Chhattisgarh plain conditions

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Abstract

Germplasm characterization was centered primarily on two major species, *Basella alba* L. and *Basella rubra* L. of the twenty four under study, Chadra, Bombay White, Soda Mota Pui, IGPB-2017-01, IGPB-2017-02, IGPB-2017-03, IGPB-2017-04, IGPB-2017-05, IGPB-2017-06, IGPB-2017-07, IGPB-2017-08, IGPB-2017-09, white green leaf margin colour were recognized as *Basella alba* L., while IGPB-2017-10, IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20, IGPB-2017-21 with red leaf margin colour was recognized as *Basella rubra* L. Germplasm characterization was centered secondarily on quantitative traits. Twenty four landraces of Indian spinach characterized in this study showed a broad variation for most of the qualitative traits under study. The variation in leaf colour, leaf shape, stem colour, stem shape, leaf margin colour, leaf margin and flower colour, were easily recognizable with visual appraisal in the material.

Keywords: Indian spinach, *Basella alba*, leaf colour, leaf shape, stem colour, stem shape, flower colour

Introduction

Indian Spinach (*Basella alba* L., $2n=48$ and *Basella rubra* L., $2n=44$) is underutilized rapidly growing tropical leafy vegetables. It belongs to the family Basellaceae and order Caryophyllales. It is native to tropical Asia, probably originated from India (Deshmukh and Gaikwad, 2016) [2]. It known as Ceylon spinach, Malabar spinach, Saanchoy (Chinese), Puisaag (Bengali), Alugbati (Philippines), Poi bhaji (Chhattisgarh).

Basella is a perennial climber (Roshan *et al.*, 2012) [7] and cultivated as an annual leafy vegetable. Roots are fibrous and show lateral expansion. Stem is fleshy, succulent, thin, smooth and bright with different colours depending on the variety. Long day condition is suitable for its cultivation. Optimum temperature for seed germination and plant growth is 18-23°C and 32°C. It is grown in almost all part of India, tropical Asia and Africa. It is rich in vitamins A, E, K, C, B2 and B9 (Grubben and Denton, 2004; Mensah *et al.*, 2008) [3] and contains micro nutrients also exhibit antioxidant properties. Indian spinach is a good source of proteins, calcium and iron (Palada and Chang, 2003; Roy *et al.*, 2010) [6]. The leaves are also used (Lucas 1988) for making soups. It has medical, nutritional and economic importance. For small and marginal farmers close to major urban centres, this crop is a reliable source of income. It offers food value and is high in proteins, vitamins, minerals, carbohydrates and dietary fibre.

It is a minor leafy vegetable and since it is generally grouped together with other greens leafy vegetable. It is found to be versatile in properties (Saroj *et al.* 2012). It can be used as leafy vegetable, ornamental plant for making of dye and medicine. Tender shoots with succulent stem along with thick, semi-succulent and mucilaginous leaves are used as leafy vegetable. It is widely cultivated for its mildly mucilaginous young succulent shoots. It has a beneficial effect on the storage of total-body vitamin A in humans. *Basella* spp. is used for Ayurvedic care in India. As anticancer *viz.* leaves and stem. (Adhikari *et al.*, 2012) [1]. *Basella alba* has been used for the treatment of several diseases such as dysentery, diarrhoea, kidney disease and cancer since a long time ago.

Material and Methods

The present research work was regulate at Research cum Instructional farm Department of Vegetable Science, College of Agriculture, Indira Gandhi Agricultural University, Raipur, Chhattisgarh, during the rabi season of 2019. Chhattisgarh is situated between 17° 14' N and 24° 45' N latitude and 79° 16' E and 84° 15' E longitude with an altitude of (289.60m). Overhead mean sea level. The maximum mean temperature was 32.30°C and minimum mean temperature was 23.99°C during the crop growing period time. The overall total rainfall during growing period was (1199.2 mm).

Experiment were laid out in Randomized Block Design (RBD) with twenty four germplasm lines in three replication during in the year. The plot size of 2.0 m × 1.5 m consisted of 288 plants per replication. Direct seed are sown at 50 cm (Row to Row) × 50 cm (Plant to Plant) spacing. Recommended agronomical practices were followed to raise the crop. Observation on various quantitative characters and on yield were recorded on five randomly selected plants from each replication *viz.*, germination percentage, number of leaves per plant, plant height (cm), leaf length (cm), leaf width (cm), number of branches per plant, petiole length (cm), inter-nodal length (cm), duration of crop, number of pickings, days to 50% flowering, dry matter percentage, leaf weight (g), stem weight (g) and yield per plot (kg/plot).

Result and Discussion

The comparative view of plants, tender shoots and leaves of twenty four landraces is depicted in table 1. Plant of twenty four landraces displayed great diversity in their leaf colour (dark green/light green) of the twenty landraces, the landraces Chadra, Bombay White, Soda Mota Pui, IGPB-2017-01, IGPB-2017-02, IGPB-2017-03, IGPB-2017-04, IGPB-2017-05, IGPB-2017-06, IGPB-2017-07, IGPB-2017-08 and IGPB-2017-09 had dark green coloured and the landraces IGPB-2017-10, IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20 and IGPB-2017-21 had light green coloured. Stem was green coloured

(Chadra, Bombay White, Soda Mota Pui, IGPB-2017-01, IGPB-2017-02, IGPB-2017-03, IGPB-2017-04, IGPB-2017-05, IGPB-2017-06, IGPB-2017-07, IGPB-2017-08, IGPB-2017-09 and IGPB-2017-10) and stem were light green coloured in (IGPB-2017-03 and IGPB-2017-04) and stem were light red coloured in IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20 and IGPB-2017-21. Leaf were oval (Chadra, Bombay White, Soda Mota Pui, IGPB-2017-01, IGPB-2017-02, IGPB-2017-04, IGPB-2017-05, IGPB-2017-06, IGPB-2017-07, IGPB-2017-08 and IGPB-2017-09) to ovate (IGPB-2017-03, IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20 and IGPB-2017-21) in shape. Stem were angular (Chadra, Bombay White, Soda Mota Pui, IGPB-2017-02, IGPB-2017-06, IGPB-2017-07 and IGPB-2017-08) to round (IGPB-2017-01, IGPB-2017-03, IGPB-2017-04, IGPB-2017-05, IGPB-2017-09, IGPB-2017-10, IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20 and IGPB-2017-21) in shape. Flower were white (Chadra, Bombay White, Soda Mota Pui, IGPB-2017-01, IGPB-2017-02, IGPB-2017-03, IGPB-2017-04, IGPB-2017-05, IGPB-2017-06, IGPB-2017-07, IGPB-2017-08 and IGPB-2017-09) to red (IGPB-2017-10, IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20 and IGPB-2017-21) in coloured. Leaf were margin green (Chadra, Bombay White, Soda Mota Pui, IGPB-2017-01, IGPB-2017-02, IGPB-2017-03, IGPB-2017-04, IGPB-2017-05, IGPB-2017-06, IGPB-2017-07, IGPB-2017-08 and IGPB-2017-09) to red (IGPB-2017-10, IGPB-2017-11, IGPB-2017-12, IGPB-2017-13, IGPB-2017-14, IGPB-2017-15, IGPB-2017-16, IGPB-2017-17, IGPB-2017-18, IGPB-2017-19, IGPB-2017-20 and IGPB-2017-21) in coloured.

Table 1: Qualitative traits of twenty four landraces of Indian spinach

Genotypes	Leaf colour	Leaf shape	Stem colour	Stem shape	Leaf margin	Leaf margin colour	Flower colour
Chadra	Dark green	Oval	Dark green	Angular	Entire	Green	White
Bombay white	Dark green	Oval	Dark green	Angular	Entire	Green	White
Sada Mota Pui	Dark green	Oval	Dark green	Angular	Entire	Green	White
IGPB-2017-01	Dark green	Oval	Dark green	Round	Entire	Green	White
IGPB-2017-02	Dark green	Oval	Dark green	Angular	Entire	Green	White
IGPB-2017-03	Light green	Ovate	Light green	Round	Entire	Green	White
IGPB-2017-04	Light green	Oval	Light green	Round	Entire	Green	White
IGPB-2017-05	Dark green	Oval	Dark green	Round	Entire	Green	White
IGPB-2017-06	Dark green	Oval	Dark green	Angular	Entire	Green	White
IGPB-2017-07	Dark green	Oval	Dark green	Angular	Entire	Green	White
IGPB-2017-08	Dark green	Oval	Dark green	Angular	Entire	Green	White
IGPB-2017-09	Dark green	Oval	Dark green	Round	Entire	Green	White
IGPB-2017-10	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-11	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-12	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-13	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-14	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-15	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-16	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-17	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-18	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-19	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-20	Light red	Ovate	Light red	Round	Entire	Red	Pink
IGPB-2017-21	Light red	Ovate	Light red	Round	Entire	Red	Pink

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