

## SHORT COMMUNICATION

**Genetic Variability for Morphological Characters and Glycosides in *Stevia rebaudiana* Bertoni)****Nitu Singh<sup>1</sup>, Punit Mohan<sup>2</sup> and AD Choudhary<sup>3</sup>**<sup>1</sup>Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur-440013, Maharashtra<sup>2</sup>Division of Crop Improvement, Central Institute for Cotton Research, Nagpur-440010, Maharashtra<sup>3</sup>Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur-440013, Maharashtra

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Morphological and stevioside parameters in three diverse genotypes (GVS-6, HPSR and MPSR) of *Stevia rebaudiana* were studied under hot and semi-humid climatic conditions of Nagpur, for three years (2008 -2010). The cultivar GVS-6 was identified as most promising for high stevioside content and biomass yield. The variations in morphological parameters of stevia cultivars were significant. Pooled results revealed that cultivar GVS-6 has optimum plant height (36.4 cm) with highest branches (14 number) and leaves (199.9 number), higher total dry biomass yield per plant (126.0 g) and stevioside (49.8%). High biomass production and stevioside content in a variety of stevia is very important for economic valuation in agriculture and medicinal aspects.

**Key Words: Glycoside, Morphological characters, *Stevia rebaudiana*, Stevioside**

*Stevia rebaudiana* Bertoni  $2n = 2x = 22$ , is a herbaceous perennial belonging to Asteraceae and being a zero calorie sweetener, has many medicinal properties. It is believed to have originated in the high land regions of north-eastern Paraguay (on the Brazilian border) and is widely distributed in USA, Brazil, Japan, China and Korea. *Stevia* grows in semi-humid and sub-tropical region, like any other vegetative crop. Stevioside, the sweetener, extracted from the plants is 300 times sweeter than sugar and is used as a natural alternative to artificial sweetener (Megeji *et al.*, 2005). In the past, studies on stevia have been confined mainly to the biochemical constituents and very little information is available so far about the extent of variability for various morphological and biochemical traits under semi-arid climate. Hence, the present investigation was undertaken to study the variability for important morphological traits along with stevioside content in three diverse genotypes collected from Garshankar, Punjab (GVS-6), Palampur, Himachal Pradesh (HPSR) and Mohankheda, Madhya Pradesh (MPSR).

Above genotypes were established in 30 pots (10 pots of each genotype) in green house of Botany Department, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, during September 2007. Three genotypes were replicated 10 times using RBD for statistical analysis to evaluate treatments difference. Observations were

recorded for the first cuttings in February of each year for various parameters like vegetative growth, biomass yield and steviol glycoside (stevioside) content. Fertilizer and water management was done as per package of practices. No chemical spray was used on stevia plants. The powder prepared from dried leaves of composite sample of each stevia genotype was subjected to chemical analysis by HPLC method. The Cecil Adept 4201 system was used for the analysis of stevioside content.

Data on morphological parameters, glycoside and stevioside content in stevia, presented in Table 1, is the mean of data for three years. Pooled results revealed that the variation in morphological characters was significant. Maximum plant height (52.8 cm) was observed in variety HPSR followed by MPSR (44.1 cm) and GVS-6 (42.6 cm). Maximum number of branches and leaves per plant (13.3 and 199.6, respectively) were observed in GVS-6 followed by MPSR (7.0 and 156.8, respectively) while HPSR variety showed few branches (5.0) and leaves (114.3) with large leaf (5.7 cm) (Plate 1). Highest dry leaf biomass (96.6 g) was recorded in GVS-6 and lowest (80.5 g) in MPSR while dry stem biomass was maximum (33.5 g) in HPSR (Table 1). Further study revealed that the fresh and dry biomass of stem and leaf were more variable than plant height at first cutting's observation. These findings are in agreement with the findings of Shyu *et al.* (1994) and Chalapathi *et al.* (1998). Total biomass

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**Table 1. Morphological characteristics and stevioside of different genotypes of *Stevia rebaudiana***

Characters	GVS-6	HPSR	MPSR	CV	CD at 5%
Plant height (cm)	42.6	52.8	44.0	21.10	7.43
Branches per plant	13.3	5.0	7.0	35.89	2.85
Leaves per plant	199.6	114.3	156.8	26.77	39.40
Days to flowering	65.5	92.9	78.3	4.93	2.16
Leaf length (cm)	3.5	5.7	3.7	2.41	1.60
Dry stem biomass / plant (g)	29.4	33.5	32.0	4.05	3.10
Dry leaf biomass/ plant(g)	96.6	90.4	80.5	4.66	4.91
*Total biomass yield/plant (g)	126.0	123.9	112.5	11.20	9.8
Leaf: Stem ratio	3.3	2.7	2.5	–	–
Total glycoside (mg/100ml)	143.9	238.2	205.5	–	–
Stevioside content (%)	49.8	42.7	45.1		

\*Biomass yield: weight of leaves+ stem

yield of stevia (leaf + stem) per plant was highest in GVS-6 (126.0 g) followed by HPSR (123.9 g) and MPSR (112.5 g). Regarding days to flower, HPSR exhibited longer duration (92.9 days) than GVS-6 (65.5 days). More number of leaves and days to flowering are important traits for productivity in stevia. (Sumida, 1980; Shyu *et al.*, 1994). Maximum stevioside content was recorded in GVS-6 (49.8%) followed by MPSR (45.1%) and minimum in HPSR (42.7%). Among the three genotypes of

*S. rebaudiana* evaluated in pots, highest concentration of stevioside was in GVS-6. These findings are in accordance with those of Bondarev *et al.* (2003).

The present investigations reveal that GVS-6 (from Punjab collection) is the most suitable variety for semi-arid climate due to high biomass and stevioside content and it would be preferred by the farmers and pharmaceutical industry. Hence, this variety can be utilized in future breeding programme. The demand for stevia leaves has been attracting the attention and interest of farmers who view it as a new opportunity and rich promise for a real agricultural option.

## References

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