

9. CONCLUSIONS

The present research focused on phenetic analyses of *Senna obtusifolia* (L.) H.S. Irwin and Barneby collected from various provenances of India including West Bengal for prospecting greater availability of Rhein, a bioactive secondary metabolite with immense medicinal properties. The process of extraction, identification and quantification of Rhein from the leaves of *S. obtusifolia* were reported for the first time in literature. The HPLC and ESI-MS studies confirmed the quantity of Rhein extracted from leaf samples of all the provenances. The maximum quantity (31.94 µg/gm of dried leaf) of Rhein was extracted from the sample collected from Raipur, Chhattisgarh.

Phenological and morphological studies were performed to identify the characteristics that are most significantly related to the quantity of Rhein extracted. The regression and ANOVA analyses identified the minimum temperature, plant height and bract length as significant characteristics. Therefore, places with a higher minimum temperature during the growth period witnessed with greater plant height and bract length and showed greater Rhein quantity. Consequently, the Rhein quantity was found to be increased in the warmer zones of India. The results of morphometric study using PCA identified the attributes of flowers of *S. obtusifolia* as most important among all the attributes of plant. Cytological investigations on the species from all the provenances showed coherent genetic structures among themselves. The genetic variations of *S. obtusifolia* were studied through AFLP analyses also showed subtle variations of the species among provenances. The cluster analysis considering all the attributes of the phenetic study revealed the minimum variations of the samples collected from proximal areas and thereby belong to the same cluster setting apart the samples collected from the distal provenances. From these studies, it may be concluded that the *S. obtusifolia*

plants growing in warmer zones with higher minimum temperature during the growth period having greater heights in combination serves as the index for the highest Rhein producer. These findings may help to identify the provenance for the best production of Rhein.