

## Amino acids changes in various stages of stigma development in *Gossypium herbaceum* L.

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### SUMMARY

A comparative study of the qualitative changes in free amino acids in the stigma before, during and after pollination stage. Chromatographic separation of free amino acids showed that 11 types of amino acids were present in stigma of before pollination but during after pollination the number of types of amino acids increased to sixteen. This depicts that five new types of amino acids appeared during pollination in stigma. The possible role of newly appeared amino acids can be assigned to synthesis of proteins required for the recognition of compatible pollen grain, pollen germination and tube growth in *Gossypium herbaceum* L.

Key words: Amino acids, Stigma, Chromatography, *Gossypium herbaceum* L.

The main function of the stigma is to provide platform for pollen deposition and to provide suitable condition of pollen germination. In many plants small amount of various types of amino acids present in stigmatic tissue. The stigma and style contain 16 and 18 amino acids respectively, whereas, the ovary contained in all 22 amino acid in *Sesbania aegyptica*. The amino acids like L-Alanine, Glutamine, Methionine and Phenylalanine were absent in both stigmatic as well as stylar region in *Sesbania aegyptica* (Dnyansagar, 1974). Major part of the free amino acids may serve as a substitute for increased respiratory activity in the post pollinated ovary (Linskens and Tupy, 1966). The precise relationship between various amino acid level and the physiological status of stigma is not very clear. In the present investigation an attempt is made to assess amino acids changes take place during various stages of stigma i.e. before, during and after pollination stage in *Gossypium herbaceum* L.

### MATERIALS AND METHODS

500 mg. of stigma were collected from the plants of *Gossypium herbaceum* L. were growing in the botanical garden of M. N. College, Visnagar for each developmental stages of stigma i.e. before, during and after pollination stage. Material was later grinded using a pestle and mortar in 70% ethanol. The supernatant was used for the separation of amino acids. To run the standard each known amino acid was dissolved in 10% Iso propanol, except Tyrosine, Phenylalanine and Typtophane. Tyrosine and Phenylalanine were dissolved in 0.5 N HCl while Tryptophane was dissolved in 0.05 N NaOH. Single dimension ascending chromatography was done following the method of Plummer (1999).

### RESULTS AND DISCUSSION

Qualitative determination of free amino acids by

ascending paper chromatography indicate that in fresh stigma of during and after pollination stage of *Gossypium herbaceum* L. contain 16 types of amino acids, out of 24 types of known amino acids are present (Plate-1, Table-1). Amino acids appeared on chromatographic sheet are DL-Alanine, L-Arginine HCl, DL-Aspartic acid, L-Cysteine, DL-Dopa, L-Glutamic acid, Glycine, DL-Iso-leucine, L-Lysine, DL-Methionine, L-Ornithin HCl, L-Proline, DL-Threonine, DL-Tryptophane, L-Tyrosine and DL-Valine (Plate-1), while before pollination stage, only 11 types of amino acids are reported in the stigma. This 5 new types of amino acids appeared in stigma of during pollination stage. These amino acids are DL-Alanine, L-Glutamic acid, Glycine, L-lysine, and Tyrosine.

These newly appeared amino acids into stigma may be either due to: transfer of pollen grains, containing these amino acids, to stigma or synthesis of these amino acids in stigma. Similar results were also observed in stigma of *Solanum surattense* Brum. f. (Patel, 2002) and in *Erythrina*, *Sesbania* and *Laurentis* (Thomas, 1976). Amino acids such as Arginine, Iso-leucine, Leucine, Lysine, Proline and Threonine showed four times increase while Serine and Tyrosine showed six times increase in stigma of *Sesbania aegyptica* after pollination (Dnyansagar, 1974). In *Zea mays* under optimum nutritional and light conditions increased level of alanine, proline and arginine are reported in its pollen (Tseluiko, 1968). In *Nicotiana tabacum* amongst different amino acid tested only Glumatic acid and Aspartic acid and their amides stimulated pollen tube (Tupy *et al.*, 1983) where as Glycine is promoted germination and tube growth in *Crotolaria juncea* (Linskens and Tupy, 1973). Swada reported that Arginine, Valine and Alanine promoted germination of *Oryza sativa* pollen. He also investigated that the addition of Aspartic acid, Glumatic acid and Cystein