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# NECTAR CHARACTERISTICS OF SOME BUTTERFLY VISITING FLOWERS

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In all sixteen butterfly visiting plant species were studied for nectar composition with respect to amino acidal profile and sugars since they form nutritionally important components. Both protein and non-protein amino acids, types of sugars present in nectar and their dominance were noted. Paper chromatographic technique was employed for the present study. Flower colour and flower type were also noted to see whether any relationship between visiting butterflies and flower type and nectar composition can be established.

**Keywords :** Amino Acids; Butterfly; Nectar; Sugars.

## Introduction

Sight of monsoon field with variously coloured butterflies howering over and alighting on equally colourful flowers, fascinates every one from childhood to old age. So intimate is the association of butterflies and flowers that it is almost impossible to think one excluding the other. Butterflies belong to class Lepidoptera. Butterflies do not brood on nectars but they collect all the food for their own consumption. However, they are not obligatory flower foragers. Many of the butterflies are spurious pollinators.

Butterflies alight on the blossom, generally sitting on the margin of funnel, or trumpet shaped flowers[1]. They prefer sucking nectar out of narrow tubes. Naturally there is a relation between the tongue length and the floret tube length. In addition, tongue guides and smooth floral texture also decides the butterfly preference. Strength of probosis also sometimes is a deciding factor[2].

Chemoreceptors are located on the feet of butterflies. Different butterflies have inborn preferences for various colours[3]. Red, yellow, blue and pink flowers are most preferred by butterflies[4]. Opler and Krizeks[5] also demonstrated floral colour preferences by butterflies. However, very little information is available regarding the nectar composition.

## Material and Methods

Sixteen plant species were selected for the present studies. Out of these, eleven are the species studied by Solomon *et al*[3], while five by Wadatkar[6] for butterfly visits. Singh *et al*[7] is followed for nomenclature of plant species studied.

Nectars were collected in the morning between 7.00 to 9.00 a.m. Nectar analysis was carried out with respect to the amino acid and sugar composition following Harborne[8]. Amino acids were studied by two dimensional chromatography and identifications of protein amino acids were made by comparing with the standards. Standard values given by Lederer and Lederer[9] were used to identify non-protein amino acids. Sugar composition of nectars was studied by one dimensional chromatography and identified by comparing with standards. Nectar consistancy was noted as per general perception as thin, moderately thick and thick nectars with respect to the concentration of sugars.

## Result and Discussion

As far as the composition of amino acids in nectar is concerned, the butterfly visiting plant species studied here show tremendous variation. In all fifteen different types of protein amino acids, twelve non-protein amino acids and two unidentified were found to be present (Table 1). Out of sixteen plant species, *Asystasia dalzelliana* showed only traces of amino acids in its nectar while *Gmelina arborea* has maximum i.e. ten amino acids. Only three amino acids are found to be present in the nectar of *Impatiens balsamina, Momordica charantia* and *Rostellularia japonica*.

Protein amino acids were found to be of more common occurence than non-protein amino acids. It is obviously because protein amino acids impart high caloric value to the nectar. Tyrosine and Glutamic acid are the most commonly found amino acids. Tyrosine was found in nine while glutamic acid in seven species. Glycine and Tryptophan are present only in *I. balsamina* and *I.*

**Table 1.**

| Sr. No. | Plant Species and Flowering Period | Flower colour | Type of Flower | Nectar Consistancy | Amino Acids | | Sugars |
|---|---|---|---|---|---|---|---|
| | | | | | Protein Amino Acids | Non-Protein Amino Acids | |
| 1. | *Impatiens balsamina* Linn. Balsaminaceae. (Aug. to Nov.) | Pink, Dark Red | Spurred | Moderate | 3, 5, 6. | | SF |
| 2. | *Azadirachta indica* A. Juss. Meliaceae. (Jan. to May) | White | Open | Moderate | 5, 7, 10, 14, 15. | 5, 6. 7. | SFG |
| 3. | *Bauhinia purpurea* Linn. Caesalpiniaceae. (Sept. to Dec.) | Purple | Open | Moderate | 3, 5, 9, 12, 14. | 1. | SFG |
| 4. | *Momordica charantia* Linn. Cucurbitaceae. (June to Oct.) | Yellow | Open | Moderate | 1, 12. | 10. | FG |
| 5. | *Spermacoce articularis* L.f. Rubiaceae. (July to Jan.) | White to Bluish | Tubular; Tube long, narrow. | Moderate | 1, 4, 8, 14, U1 | | SFG |
| 6. | *Hamelia patens* Jacq. Rubiaceae. (Aug. to Nov.) | Red | Tubular; Tube long, narrow. | Thick | 4, 5, 8, 11, 14, U1 | | SF |
| 7. | *Ixora coccinea* Linn. Rubiaceae. (Throughout year) | Red | Tubular; Tube long, narrow. | Thick | 1, 8, 9, 13, 15. | 2, 6. | S |
| 8. | *Carissa congesta* Wt. Apocynaceae. (March to July) | White | Tubular; Tube long, narrow. | Moderate | 1, 5, 8, 10. | 8, 10, 12. | SF |
| 9. | *Catharanthus roseus* (L.) G. Don. Apocynaceae. (Throughout year) | White, Rose Pink | Tubular; Tube long, narrow. | Moderate | 3, 4, 11, 14. | | SF |
| 10. | *Asystasia dalzelliana* Santapau. Acanthaceae. (Nov. to Feb.) | Pale Yellow | Tubular; Tube long, narrow. | Thick | Traces | Traces | SFG |

Contd...

**Table 1.** Contd.

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|---|---|---|---|---|---|---|---|
| 11. | *Rostellularia japonica* (Thunb) Ellis. Acanthaceae. (Sept. to Dec.) | Violet | Tubular; Tube short, narrow. | Thick | 8, 9, 11. | | Traces |
| 12. | *Gmelina arborea* Roxb. Verbenaceae. (March to May) | Yellow | Tubular; Tube short, narrow. | Moderate | 1, 2, 4, 10, 12, 14, 15. | 3, 9, 11. | SFG |
| 13. | *Lantana camara* Linn. Verbenaceae. (Throughout year) | Pink turning yellow | Tubular; Tube short, narrow. | Moderate | 3, 10, 11, 12, 14. | U2. | SFG |
| 14. | *Stachytarpheta jamaicensis* (L.)Vahl. Verbenaceae.(Aug.to Dec.) | Purple | Tubular; Tube short, narrow. | Moderate | 2, 4, 5, 12, 14. | | FG |
| 15. | *Hyptis suaveolens* (L.) Poit. Lamiaceae. (Oct. to March) | Blue | Tubular; Tube short, narrow. | Thick | 1, 5, 7. | 12 | SFG |
| 16. | *Jatropha panduraefolia* Andr. Euphorbiaceae. (Throughout year) | Red | Open Flower | Thick | 3, 5, 8, 14, 15. | | F |

*Protein Amino Acids :* 1) Dl-alanine 2) Arginine 3) Aspartic acid 4) L-cystine 5) Glutamic acid 6) Glycine 7) Iso-Leucine 8) Leucine 9) Methionine 10) Proline 11) Serine 12) Threonine 13) Tryptophan 14) Tyrosine 15) Valine.

*Non-Protein Amino Acids :* 1) Alanyl glycine 2) Dl-2-amino-n-butyric acid 3) DL-Dopa 4) α - γ - diamino butyric acid 5) Glucosamine HCl 6) Hydroxy proline 7) Lysine monohydrochloride 8) Methionine sulphone 9) nor-Leucine 10) Ornithine 11) Ornithine monohydrochloride 12) DL - phenyl alanine.

| *Unknown Amino Acids* | BAW | Phenol | Colour |
|---|---|---|---|
| U1 | 0.56 | 0.22 | purple |
| U2 | 0.14 | 0.27 | orange |

Sugars: S - Sucrose, F- Fructose, G - Glucose

Dominant Sugar is indicated by bold letter.

*coccinea*, respectively.

Out of sixteen species studied non-protein amino acids were found to be present in eight, four of these species had only single non-protein amino acid.

According to Baker[10,11] concentration of nectar is inversely proportional to the concentration of sugars. However, no apparent relationship between consistancy of nectar i.e. sugar concentration and amino acidal composition was found. As far as sugar composition is concerned, only common sugars i.e sucrose, fructose and glucose were found to be present. (Table 1). Three sugar and two sugar nectars are more common; while *I. coccinea* and *J. panduraefolia* have single sugar nectars. Five species are found to produce fructose dominant nectar while only two produced sucrose dominant nectars. It is interesting to note that eight species have balanced nectar (no sugar is dominant). According to Percival[1] such balanced nectars are not common. All two sugar nectars posses fructose along with either glucose or sucrose; no glucose-sucrose combination was found.

Amongst sixteen species studied, nine have tubular and four open type of flowers. *Impatiens balsamina* has spurred flower with protected nectar, functionally resembling the tubular flower. Small flowers with narrow tubes seem to be more preferred by butterflies. *Lantana camera* appears to be ideal butterfly flower, visited by 22 butterflies species. Thirty three different butterfly species visit the flowers studied here[3,6]. However there appears to be no relationship between the nectar composition and the visiting butterflies; which again reestablishes the fact that they are only spurious foragers and pollinators.

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