PRELIMINARY PHYTOCHEMICAL STUDIES ON SOLANUM SURATTENSE BURM.F. SEEDS

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ABSTRACT:

*Solanum surattense* Burm.f. has been largely used in the indigenous system of medicine. A preliminary pharmacognostical study of the seed has been undertaken and the physico-chemical, fluorescent and qualitative phytochemical tests have been worked out and the results were presented.

INTRODUCTION

*Solanum surattense* Burm.f. (Family : Solanaceae), a genus of herbs, is distributed throughout the tropical and subtropical regions of India, South East Asia, Malaysia, Australia and also in all districts of Tamil Nadu (Mathew, 1983). Various medicinal properties of *S. surattense* are discussed (Chopra et al., 1956; Kirtikar and Basu, 1935; Anonymous, 1986; Murugesu Mudhaliar, 1988). The root is useful as expectorant in cough, asthma and juice of berries used in sore throat. Stem, flowers and fruits are bitter and carminative. Plant used as diuretic, in dropsy, leaves applied locally to relieve pain in rheumatism. Bud and flower used in watery eyes (Lama and Santra, 1976). In India, entire dried plant is used for treating leprosy, dropsy and cough (Singh et al., 1979). The present study was undertaken to evaluate the pharmacognostical features.

MATERIALS AND METHODS

Plant material

The mature fresh fruits of *S. surattense* were collected from Thirumalairayanpattinam, Karaikal, Pondicherry. The botanical identity was confirmed by a qualified botanist in Department of Siddha Medicine, Faculty of Sciences, Tamil University, Thanjavur. A voucher specimen of this taxa was deposited at Tamil University herbarium (TUH 218A).

Preparation of powder

The berries of *Solanum surattense* Burm.f. were collected and dried under shade and mechanically powdered after keeping them in an electric oven at 35°C for 24 hours. These powdered materials were used for further physicochemical and fluorescent analysis.
Preparation of Extracts

The extract was prepared through successive solvent extraction method. 100 g of shade-dried powdered seeds were extracted successively using the following solvents in a soxhlet extractor (except water extract). Petroleum ether (60°C – 80°C), Benzene (80°C), Chloroform (60°C), Ethyl alcohol (78°C) and Water (100°C). Each time prior to extraction with next solvent, powdered material was dried in an air oven below 50°C. Finally, marc was macerated with water for 24 hours to obtain the aqueous extract. The extract was concentrated by distilling off the solvent and then evaporating to dryness on a water-bath.

Physicochemical tests of the samples were carried out according to Kay (1938) and fluorescent characters of the powdered drugs analysed by the method of Chase and Pratt (1949). Qualitative phytochemical tests of the samples were also carried out following the method of Peach and Tracy (1955).

RESULTS

Physicochemical values like total ash content, acid insoluble ash, loss on drying and extractive values of seed powder and extracts are given in Table 1. Fluorescent behaviour of seed powder with different reagents are shown in Table 2. Behaviour of seed powder to different reagents is given in Table 3. The seed powder when treated with acetic acid and ammonium solution showed distinct colour reactions.

Successful solvent extract of seeds were subjected to qualitative phytochemical screening and the results are presented in Table 4. The results reveal the presence of carbohydrates, alkaloids, fixed oils, tannins and phenols, gums and mucilages. Appreciable amount of oils and fats were detected in Pet-ether and benzene extracts. More amount of carbohydrates and alkaloids were noted in seed extract and a positive response to gelatin test for tannins and phenols was observed.

DISCUSSION

The physicochemical characteristics of powder shows of its own behaviours. The fluorescent behaviour of the powder of seeds are peculiar and characteristic. Seed powder treated with acetic acid and ammonium solution showed Hay yellow and brownish yellow respectively.

Qualitative phytochemical evaluation of the seed extract contained moderate amount of carbohydrates. More Alkaloids are detected by quantitative estimation of total alkaloid or soladaline content, but it was not done in the present work. Earlier workers have estimated solasodine content in leaves, stem and berries of S. surattense, Solanum trilobatum and Solanum sisymbriifolium (Chand et
al., 1995) estimated that yellow ripe fruits (not fully ripened) of *Solanum surattense* contain maximum solasodine content (2.71%) and in over ripe fruits solasodine content declines. However mature berries of *Solanum surattense* and *S. sisymbriifolium* contain maximum amount of solasodine (1.74%) than immature berries. Highest amount of solasodine (5 g/kg) in berries of *Solanum* was reported (Gawande et al., 1991).

### Table 1
Physicochemical values in (percentage) of powdered seeds of *Solanum surattense*

| S.No. | Parameters             | Physicochemical values (%) |
|-------|------------------------|----------------------------|
| 1.    | Total ash              | 6.3343                     |
| 2.    | Acid insoluble ash     | 0.5415                     |
| 3.    | Loss on drying         | 9.080                      |
| 4.    | Extractive value       |                            |
| a)    | Petroleum              | 8.319                      |
| b)    | Benzene                | 5.650                      |
| c)    | Chloroform             | 2.309                      |
| d)    | Ethanol                | 3.845                      |
| e)    | Water                  | 26.412                     |

### Table 2
Fluorescent behaviour of seed powder of *Solanum surattense* to different reagents

| S.No. | Reagents used            | Seed                      |
|-------|--------------------------|---------------------------|
|       |                          | Visible light | UV light     |
| 1.    | Powder as such           | Hay yellow   | Light green  |
| 2.    | Powder + 1 N NaOH in water | Dark brown | Green        |
| 3.    | Powder + 1 N NaOH in ethanol | Yellowish brown | Brown     |
| 4.    | Powder + 1 N HCl         | Yellow       | Light green  |
| 5.    | Powder + 50% HCl        | Yellow       | Light green  |
| 6.    | Powder + 50% H₂SO₄      | Brown        | Green        |
**Table 3**  
**Behaviour of seed powder of *Solanum surattense* to various chemicals**

| S.No. | Powder + Reagent used                        | Colour of powder         |
|-------|-----------------------------------------------|--------------------------|
| 1.    | Powder as such                               | Hay yellow               |
| 2.    | Powder + Acetic acid                         | Yellowish brown          |
| 3.    | Powder + Ammonium oxalate solution           | Brownish yellow          |
| 4.    | Powder + Ammonia solution                    | Brownish green           |
| 5.    | Powder + Ferric chloride solution (5%)       | Olive green              |
| 6.    | Powder + Conc. hydrochloric acid             | Light brown              |
| 7.    | Powder + Iodine solution                     | Yellow                   |
| 8.    | Powder + Potassium hydroxide in alcohol      | Yellowish brown          |
| 9.    | Powder + Potassium hydroxide in water (5%)   | Yellowish Brown          |
| 10.   | Powder + Conc. Nitric acid                   | Brown                    |
| 11.   | Powder + Picric acid                         | Brown                    |
| 12.   | Powder + Sodium nitroprusside solution       | Brown                    |
| 13.   | Powder + Conc. sulphuric acid                | Red                      |
| S.No. | Test for          | Test applied reagent used | Petroleum ether | Benzene Chloroform | Ether | Water |
|-------|-------------------|---------------------------|----------------|-------------------|-------|-------|
| 1.    | Carbohydrate      | (a) Fehling’s            | -              | -                 | ++    | ++    |
|       |                   | (b) Benedict’s           | -              | -                 | -     | -     |
| 2.    | Alkaloids         | a) Dragendroff’s         | -              | -                 | ++    | ++    |
|       |                   | b) Mayer’s               | -              | -                 | ++    | ++    |
|       |                   | c) Wagner’s              | -              | -                 | ++    | ++    |
|       |                   | d) Hager’s               | -              | -                 | ++    | ++    |
| 3.    | Fixed oils and fats | Spot test                | +++            | +++               | -     | -     |
| 4.    | Saponins          | Foam test                | -              | -                 | -     | -     |
| 5.    | Tannins and phenols | a) 10% lead acetate solution | -            | -                 | -     | -     |
|       |                   | b) 1% gelatin containing 1% sodium chloride | -            | -                 | -     | -     |
| 6.    | Gum and mucilage | Alcoholic precipitation | -              | -                 | -     | -     |

**Constituents**
- (++) - Appreciable Amount
- (+) - Moderate Amount
- () - Small Amount
- (-) - Completely absent
REFERENCES

1. Anonymous, 1986. The useful plants of India, Publications and Information Directorate, CSIR, New Delhi, India, p.581.

2. Chand, R., Kumar, S., Sharma, A.K. and Srivastava, L., 1995. Variation of solasodine in Solanum sisymbriifolium and Solanum xanthocarpum with plant growth and development, Indian Drugs, 32(8): 362-365.

3. Chase, C.R. and Pratt, R.J., 1949. Fluorescence of powdered vegetable drugs with particular reference to development of a system at identification, J. Amer. Pharm. Ass., 38: 324-331.

4. Chopra, R.N., Nayar, S.L. and Chopra, I.C., 1956. Glossary of Indian Medicinal Plants, CSIR, New Delhi, India, p.229.

5. Gawande, A., Wankhade, S., Shankhopal, K.V. and Shinde, G.B., 1991. Isolation, purification and characterization of solasodine – A Steroidal alkaloid from Solanum surattense berries, Indian Drugs, 28(3): 149-150.

6. Kay, A.L., 1938. Microscopical studies of Drugs, Bailliee Tindall and Cox, London.

7. Kirtikar, K.R. and Basu, B.D., 1935. Indian Medicinal Plants III, Bishen Singh Mahendra Pal Singh, Dehradun, pp.2051-2069.

8. Lama, S. and Santra, S.C., 1979. Development of Tibetan Plant Medicine, Sci. Cult., 45: 262-265.

9. Mathew, K.M., 1983. The Flora of the Tamil Nadu Carnatic, Vol.III, Part I & II, The Rapinat Herbarium, St. Joseph’s College, Tiruchirapalli, India, pp.1061-1064.

10. Murugesu Mudhaliar, K.S., 1988. Gunapadam, Vol.I (In Tamil), Tamil Nadu Siddha Medical Board, Chennai, India, p.167.

11. Singh, M.P., Malla, S.B., Rajbhandari, S.B. and Manandhar, A., 1979. Medicinal plants of Nepal - Retrospects and Prospects, Econ. Bot., 33(2): 185-198.