Research Article

Physicochemical Evaluation for Leaves of *Solanum americanum*

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ABSTRACT
Plants of Mother Nature offers endless source of incredible biomolecules with therapeutic potentials. The present study unveils physicochemical parameters of *Solanum americanum* because to identify the adulterants and to improve the quality of the plant. This evaluation can also be used as a diagnostic tool in the correct identification of the plant.

Keywords: *Solanum americanum*, Physiochemical parameters, limit tests.

INTRODUCTION

Solanum americanum[1] is a medicinal plant indigenous to Asia and Africa. The stem and root extracts of this medicinal plant are known to possess anticancer, antioxidant and antimicrobial activity[2].It is used as an analgesic, anti-inflammatory and venotonic. From the literature survey, it is clearly understood that the physicochemical evaluation of *Solanum americanum* was not carried out. The present study is taken up the physicochemical evaluation for leaves of *Solanum americanum*.

Plant material

The Plant *Solanum americanum* was collected from, Tirupati and were authenticated by Department of Botany, S.V.University, Tirupati. The Voucher Specimens of these plants were preserved in the herbarium of the Pharmacognosy Department of this institution.

Experimental work

MATERIALS AND METHODS

Requirements

Leaf powder, Nessler cylinders, tongs, blance, petridishes, glassrod, test tubes, measuring cylinder, sieve no. 60, spatula, funnel, specific gravity bottle, china dish, hot air oven.

Chemicals

Methanol, chloroform, water, ethanol, pumice powder, KOH, 0.5M HCl, nitric acid, sodium chloride, potassium sulphate, barium sulphate, silver nitrate, phenolphthalein.

Determination of acid values[3]

Definition of acid value

Acid value is defined as the number which express in milligrams, the amount of potassium hydroxide necessary to neutralize the free acids present in 1 gm of the sample.

Procedure

- Weigh accurately 10 gm of the sample and dissolve it in 50 ml of a mixture of ethanol (95%) and 25 ml of ether previously neutralized with 0.1M potassium hydroxide using phenolphthalein indicator.
- If required dissolve the sample by heating slowly and using reflux condenser.
- To the above sample solution add 1ml of phenolphthalein indicator and titrate with 0.1M potassium hydroxide solution up to the end point pink produced after shaking for half minute.

Acid value=5.61n/w

Where n=ml of 0.1M potassium hydroxide solution required, w=weight of the sample in gm.

Determination of saponification value[4]
Definition of saponification value
Saponification value is defined as the number of mg of potassium hydroxide required to saponify the ester in 1gm of sample substance.

Procedure

- Weigh accurately 2 gm of sample and add it to 200ml glass flask fitted with reflux condenser.
- Add 25ml of 0.5M ethanolic potassium hydroxide and small quantity of pumice powder and boil for 30 minutes on water bath under reflux.
- Add 1 ml phenolphthalein solution and titrate immediately with 0.5M hydrochloric acid(x).
- Take the blank reading by repeating the same procedure(y).

Calculate the saponification value as

Saponification value= 28.05(y-x)/w,

Where w=weight of substance in gm.

Determination of ethanol soluble extractive value[5]

- Prepare coarse powder of air-dried drug.
- Take 100ml of ethanol (specified strength) in conical flask.
- Macerate 5 gm of powdered drug in above conical flask, close the conical flask and keep it for 24 hours.
- Shake the flask frequently during first 6 hours; allow it to stand for 18 hours.
- Evaporate 25ml of the filtrate to dryness in a tarred flat bottomed shallow dish.
- Dry at 105 c and weigh it.
- Calculate the percentage of ethanol soluble extractive value with reference to the air drug.

Determination of water soluble extractive value[6]

- Prepare coarse powder of air dried drug.
- Take 100ml of chloroform water in conical flask.
- Macerate 5 g powdered drug in the above conical flask, close the conical flask and keep it for 24 hours.
- Shake the flask frequently during first 6 hours; allow it to stand for 18 hours.
- Filter rapidly preventing loss of chloroform.
- Evaporate 25ml of the filtrate to dryness in a tarred flat bottomed shallow dish.
- Dry at 105o c and weigh it.
- Calculate the percentage of water soluble extractive value with reference to the air dried drug.

Determination of ash value[7]

- Weigh accurately 2 to 3 gm of air dried crude drug in a treated silica dish and incinerate at temperature not exceeding 450 c until free from carbon.
- Cool the silica dish and weigh.
- If a carbon free ash cannot be obtained, exhausted the charred mass with hot water.
- Collect the residue on an ash less filter paper, until the ash is white or nearly white, add the filtrate, evaporate to dryness and ignite at temperature not exceeding 450o c.
- Calculate the percentage of ash with reference to the air dried drug.

Physical parameters
Bulk density[8]
Bulk density = mass of a powder (w)/ bulk volume

Method

- A powder about (60gm) is passed through a standard sieve number 20.
- A weighed amount is introduced into a 100ml measuring cylinder. The cylinder is fixed on the bulk density apparatus and the timer knob is set (regulator) for 100 tapping.
- The volume occupied by the powder is noted.
- For reproducible results, the process of tapings may be continued until concurrent volume is achieved.
- This final volume is the bulk volume.

True density[9]
True density = weight of powder/ true volume of powder.

Method
The true densities of the *Solanum americanum* leaf powder and formulations were determined by the liquid displacement method using immiscible solvent (ethyl alcohol) and the true density ($\rho\tau$)was computed (n=3) according to the following equation:

$$\rho\tau = \mathbf{W1/(W2+W1) - W3 * SG}$$

Where W1 is the weight of powder,
SG is the specific gravity of the solvent,
W2 is the weight of bottle and solvent and
W3 is the weight of bottle, solvent and powder.

Flow properties
Angle of repose[10]
Definition
Angle of repose is defined as the maximum angle possible between the surface of a pile of the powder and the horizontal plane.

$$\text{Tan } \theta = h/r$$

Method

- A glass funnel is held in place with a clamp on a ring support over a glass plate.
- Approximately 100g of powder is transferred into the funnel, keep the orifice of the funnel blocked by the thumb. As the thumb is removed, the powder is emptied from the funnel.
- The distance between the bottle of the funnel stem and the top of the powder pile must be 6.4mm.
- The angle of the heap to the horizontal plane is measured with a protractor.
- The height of the pile(h) and the radius of the base (r) are measured with the ruler.
- The angle of repose is thus estimated.

Chemical tests[11]
Limit tests
Test for chlorides
Test solution
Specified amount of substance (1g)taken and add 1ml of water then add 1ml of nitric acid then diluted to 50ml in nessler cylinder then add 1 ml of silver nitrate solution. The opalescences in the sample and standard solution are compared by keeping the nessler cylinder against proper background and observing side by side.

Standard solution
1 ml of 0.05842%w/v solution of sodium chloride and add 1ml of nitric acid and dilutes to 50ml in nessler cylinder then add 1ml of silver nitrate solution. The opalescences in the sample and standard solution are compare by keeping the nessler cylinder against proper background and observing side by side.

Limit test for sulphates
Test solution
Specified substances (1g) taken then add 2ml hydrochloric acid diluted to 45ml then add 5ml solution of barium sulphate reagent.

Standard solution
1ml of 0.1089%w/v solution of potassium sulphate then add 2ml of hydrochloric acid and then diluted to 45ml with water add 5ml solution of barium sulphate reagent. The turbidity in the sample and standard solution are compared by keeping the nessler cylinder against proper background and observing side by side.

RESULTS AND DISCUSSION

From the above observation, the physicochemical analysis and the limit tests of crude powder were used for identifying the adulterants and to improve the quality of the plant.

CONCLUSION

The result of the present study may serve as a guide in the selection of plant for further work of isolation, elucidation and pharmacological screening of the active compounds.

ACKNOWLEDGEMENTS

The authors are thankful to Smt. P.Sulochana, Correspondent, Sri Padmavathi school of Pharmacy, Tiruchanoor, Tirupati for providing facilities to carry out this work.

Table I:

S.No	Physical constants	Percentage w\w/µ/Θ
1	Acid Value	2.6
2..	Saponification value	158.5
3.	Ash value	42.0
4.	Ethanol soluble extractive value	0.857
5.	Water soluble extractive value	0.68
6.	Porosity	0.448
7.	Percentage of porosity	44.8%
8.	Bulk density	0.4g/cm^3
9.	True density	0.77 g/cm^3
10.	Angle of repose	40.25

Table II:

S.No	Limit tests	Powdered Drug of *Solanum americanum*
1.	For chlorides	Present
2.	For sulphates	Present

Fig. 1: *Solanum americanum*

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