

THE PHARMACOGNOSY OF NATTU ATIVIDAYAM – THE CORMS OF CRYPTOCORYNE SPIRALIS FISCH

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ABSTRACT: *The pharmacognosy of Nattu Atividayam the corms of Cryptocoryne spiralis Fisch – its macroscopical, microscopical and chemical studies – is reported.*

INTRODUCTION

Ativisa or Atividayam, an important single drug in Ayurveda and Siddha Systems of medicine, is useful in diarrhoea and vomiting of children. It is hot, stomachic, digestive, tonic alleviates dysentery and bilious complaints and good in periodic and intermittent fevers.

Two types of drugs are available in the local crude drug market in the same name Ativisa or Athividayam. One is the tubers of *Aconitum heterophyllum* Wall of the family Ranunculaceae (Dymock. W., 1885, Nadkarni. K. M. 1908, Kirtikar. K. R and Basu B. D. 1918 and Chopra R. N. et al 1956). Another drug has been identified in our Laboratory as the corms of *Cryptocoryne spiralis* Fisch of the family Araceae (Anandakumar A. et al 1981). It is also known as Nattu atividayam.

The present paper contributes to the Pharmacognosy of Nattu atividayam – Corms of *cryptocoryne spiralis* Fisch.

MATERIALS AND METHODS

Nattu atividayam was procured from the local market, its macroscopical (Trease G. E. and Evans W. C. 1966) and microscopical (Johansen D. A. 1939, Trease G. E. and Evans W. C. 1966) characters were examined. The proximate chemical analysis like loss of weight on drying, moisture content, volatile matter, ash content, water soluble ash, alkalinity of water soluble ash, acid insoluble ash, water soluble extractive, alcohol soluble extractive and chloroform soluble extractive were determined by standard pharmacopoeial methods (Indian Pharmacopoeia 1970). The powdered drug was also extracted successively with various non-polar and polar solvents in a soxhlet type extractor. The results of the above findings are furnished in Table – I.

The reducing sugar and the total sugar content (David Pearson, 1976) were determined by gravimetric copper reduction method. The total nitrogen (David Pearson,

1976) was determined by Kjeldahl method. The total glycosides (Krishnamoorthy U and Seshadri T. R. 1962) and the total alkaloids were also determined⁵. The results are furnished in Table – II.

Observations and results:

Macroscopical characters : The drug consisted of the dried and swollen under ground stem technically known as Corm. It was erect with a large terminal bud. The drug was upto 7 cm. long and 1.5 cm. in diameter. It was blackish brown or yellowish brown in colour. The body was differentiated into nodes and internodes.

The terminal bud was covered by many radial leaf bases. The leaves were sessile, linear, grass like, herbaceous, veined in parallel pattern and with vaginate base.

The roots were adventitious rarely branched, slightly spongy, 4 – 5 cm. long, 2 – 3 mm. in dia. and yellow in colour. Few specimens were contractile roots and the old corm gave rise to daughter corms. In one rare specimen, a fruit had been found attached to the corm. The fruit rose separately away from the leaf clusters. The fruit was a berry 11 x 6 cm. in size, bluish black in colour and its stalk was 1.5 cm. long, yellow coloured and flat in dried condition. The fruit had as many as 15 oblong seeds. Seeds were 3 – 4 sided, rugose, black in colour, 5 x 2 mm. in size and with a reddish caruncle.

Microscopical characters:

Root : Root, 3 mm. in dia., showed in cross section a circular outline with one layered epiblema, a broad cortex and a small central stele. Epiblema was 20 – 24 – 32 x 16 – 20 – 24 microns in size. The cortex was parenchymatous and the cells were tangentially elongated but regularly

arranged. They were 16 – 40 – 100 – 168 x 12 – 16 – 18 microns in size. The cells were loaded with starch granules. Few cells contained orange coloured sap which stained positive with Ferric chloride and Sudan III reagents.

The endodermis was quite distinct and the cells had orange coloured sap. The pericycle was parenchymatous and 1 – 2 layers thick. The xylem showed monocotyledonous characters with polyarch and exarchy protoxylem. There were usually four big metaxylem vessels. The vessels were quite long, spirally thickened and upto 20 microns in diameter. The phloem islands were present between the protoxylem points and the cells contained orange coloured sap. Pith was very small, 4 – 5 cell wide and parenchymatous.

Corm : The corm in cross section showed an outer periderm and an inner broad parenchymatous ground tissues, in the centre of which the vascular bundles were found scattered.

The cork was often found peeled off, 4 – 5 layered and the cells were 48 – 60 – 64 x 12 – 16 microns in size. The phelloderm was not distinct. The cortex was quite broad and fully parenchymatous. The cells were spherical in shape with more intercellular spaces and 48 – 80 – 88 microns in size. They were loaded with starch granules which were loaded with starch granules which were simple in nature, ovoid or spherical or irregular in shape and 8 – 12 – 24 – 28 microns in size. Scattered were numerous idioblasts which harboured bundles of needle shaped calcium oxalate crystals. Idioblasts were upto 154 microns in dia. There were also many secretory cells with orange coloured sap which stained positive with Ferric chloride and Sudan III reagents. The vascular bundles were found

scattered in the central portion of the ground tissue. The xylem surrounded the phloem completely or partially. Vessels were helically thickened 112 – 280 – 560 x 12 – 20 – 24 microns in size.

Leaf base : The leaf base in the cross section showed hydrophytic characters with aerenchymatous mesophyll. It has devoid of any stomata probably because the leaf base might have been submerged under the water.

The upper epidermis was single layered, cutinised, the cells were rapidly elongated and 16 – 24 – 32 x 24 – 28 – 36 microns in size. The mesophyll was aerenchymatous

with plenty of air spaces, the cells were 32 – 48 – 64 – 92 microns in dia. And were filled with small starch granules of 8 microns. Few cells also contained orange coloured sap. The vascular elements were poorly developed. The lower epidermis was palisade – like and the cells were 40 – 80 – 96 x 12 – 24 – 28 microns in size. There were discontinuous patches of collenchyma near the lower epidermis and each group was up to 10 cells thick.

Chemical studies :

The results of the chemical analysis are furnished in Table I and II.

TABLE – I

S. No.	Proximate chemical analysis	Percentage (W/W)
1	Loss of Weight on drying	16.09
2	Moisture content (Toluene distillation Method)	15.00
3	Volatile Matter	1.09
4	Ash content	7.30
5	Water soluble ash	7.02
6	Alkalinity of water soluble ash (c.c. of 0.1 NH ₄ Cl/gm)	0.17
7	Acid insoluble ash	0.62
8	Water soluble Extractive	18.62
9	Alcohol soluble Extractive	13.60
10	Chloroform soluble Extractive	1.31
11	Extractive principles (Successive)	
	a. Petroleum ether (60 – 80°C)	4.99

b. Benzene	0.33
c. Ether solvent	0.47
d. Alcohol	14.05
e. Water	6.83

TABLE – II

S. No.	Analytical findings	Percentage (W/W)
1	Reducing Sugar (as invert sugar)	9.55
2	Total Sugar (as invert Sugar)	11.89
3	Total nitrogen (as crude protein)	7.56
4	Total Glycosides	0.97
5	Total Alkaloids	1.45

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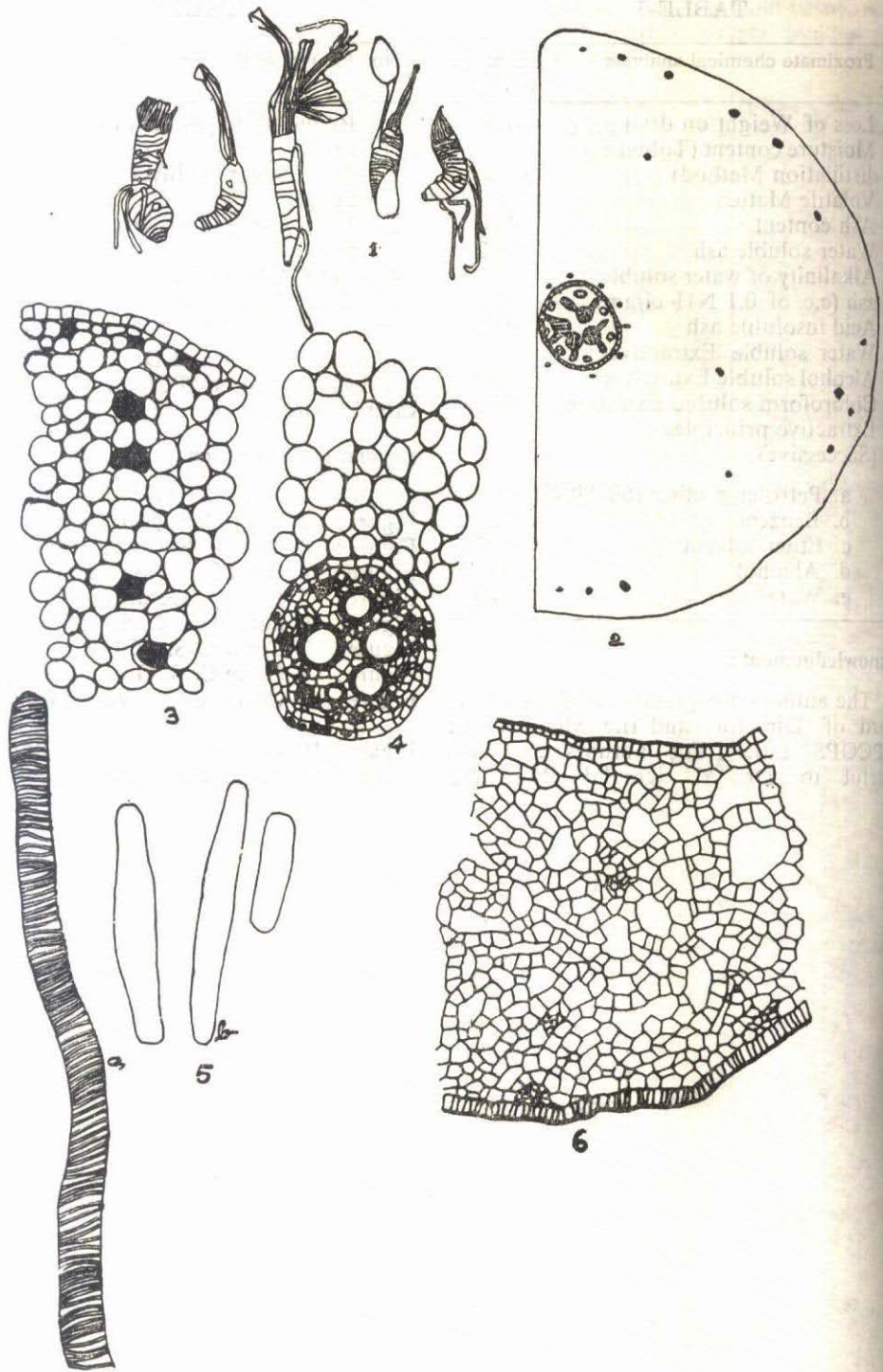
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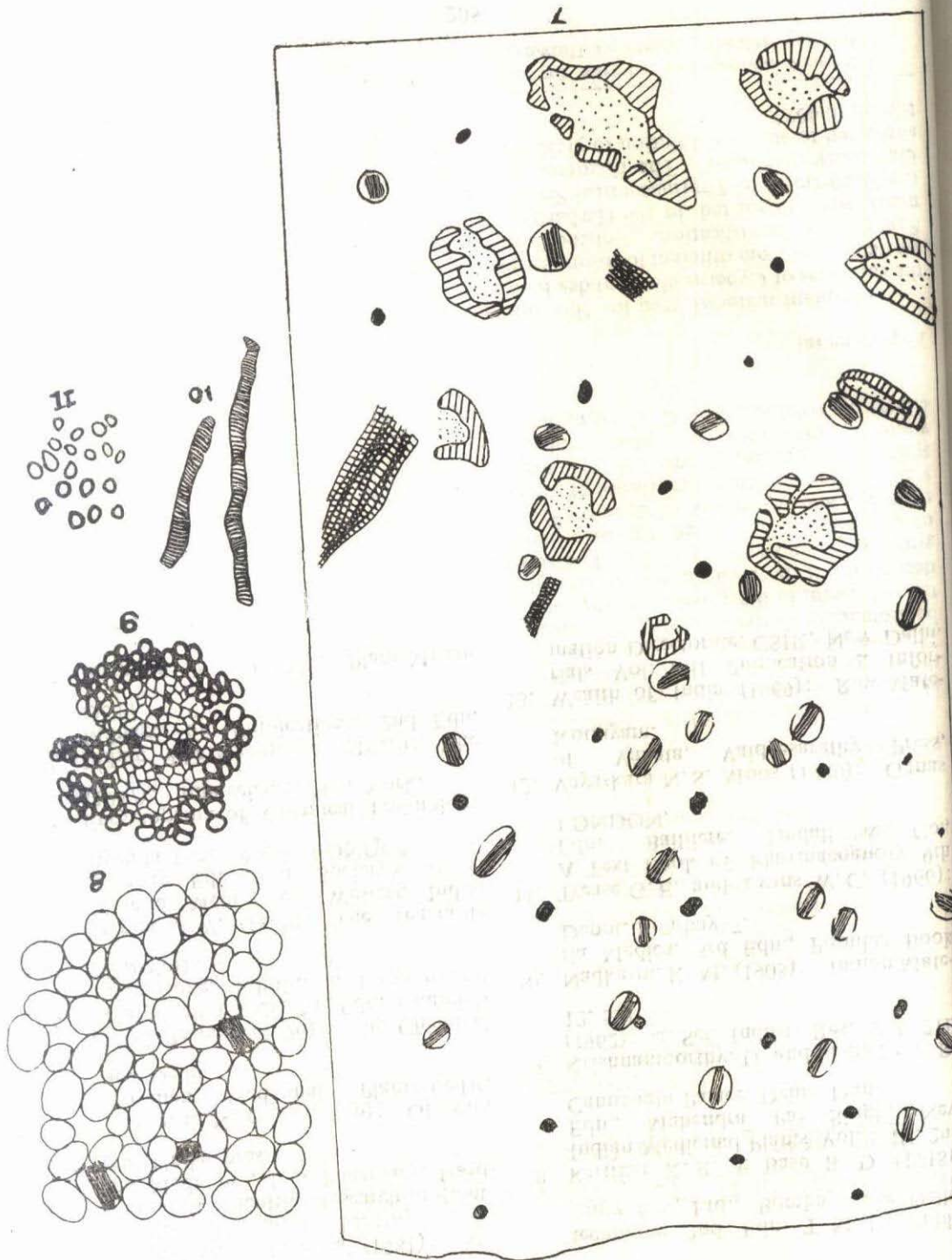
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Legend of illustrations

- Figure: 1 Nattu Athividayam Drug x 1
- Figure: 2 Root C. S. x 50
- Figure: 3 Root C. S. Cortex x 100
- Figure: 4 Root C. S. Vascular Bundle x 100
- Figure: 5 Root – Maceration x 100
- Figure: 6 Leaf base – C. S. x 50
- Figure: 7 Corm C. S. x 50
- Figure: 8 Crom C. S. Ground tissue x 100
- Figure: 9 Corm C. S. Vascular Bundle x 100.
- Figure: 10 Corm C. S. Vessels x 100
- Figure: 11 Corm Starch granules x 100





REFERENCES

1. Anandakumar. A et. Al (1981) : Ativisa – Its Botanical Identity” The Journal of Scientific Research in Plants and Medicines, Jogi Pharmacy, Hardwar (Under press).
2. Chopra. R. N. et. Al (1956): Glossary of Indian Medicinal Plants – CSIR, New Delhi.
3. David Pearson (1976) : The Chemical Analysis of Foods, 7th Edn. Churchill Livingstone, Edinburgh London and New York.
4. Dymock. W. (1885): The vegetable Materia Medica of Western India, Bombay Education Society’s Press, Byculla Tuber & co., LONDON.
5. Encyclopedia of Chemical Technology (1947): Interscience, New York.
6. Indian Pharmacopoeia (1970) : The Manager of Publications, 2nd Edn. Delhi.
7. Johansen D. A. (1939): Plant Microtechnique 2nd Edn. T. M. H. Publishing Co., Ltd., Bombay – New Delhi.
8. Kirtikar K. R. & Basu B. D. (1918): Indian Medicinal Plants Vol. I – IV, 2nd Edn., Mahendra Pal Singh, New Cannaught Palance, Dehra Dun.
9. Krishnamoorthy. U. and Seshadri T. R. (1962): J. Sci. Indust. Res. Vol. 21 B 12, 591.
10. Nadkarni K. M. (1908) : Indian Materia Medica, 3rd Edn., Popular Book Depot, Bombay – 7.
11. Trease G. E. and Evans W. C. (1966): A Text Book of Pharmacognosy 9th Edn. Bailliere, Tindall & Co., LONDON.
12. Vayaskara N. S. Moos (1980): Ganas of vahata, Vaidyasarathy Press, Kottayam.
13. Wealth of India (1969) : Raw Materials Vol I – II Publication & Information Directorate, CSIR, New Delhi.