



## FATTY ACID COMPOSITION AND PHYSICO-CHEMICAL PROPERTIES OF THE OIL EXTRACTED FROM ROOT BARK OF *VALLARIS SOLANACE* (ROTH) KUNTZE

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### ABSTRACT

Oils and fats are integral part of human diet and to match the demands of ever increasing population, there is a continuous search for new edible oils. In the present study, root barks of *Vallisneria spiralis* were examined. As the plant has root and the root bark of *Vallisneria spiralis* found to contain fine oil in 40% yield. The various physico-chemical properties of the extract also revealed the presence of fixed oil from root bark of *Vallisneria spiralis*. The results of gas chromatographic analysis indicate that oil is rich in unsaturated fatty acids like oleic, linolenic and polyunsaturated fatty acid like arachidonic acid which are the essential requirement of human diet. The oil also contains saturated fatty acids like caprylic acid, capric acid, lauric acid, palmitic acid and erucic acid and is proven to be non-toxic on animal experimentation's (rat). Since the oil is present in good yield, is non-toxic and contains essential fatty acids so has to promise to be used as an alternate source of edible oil.

**Key words:** *Vallisneria spiralis* (Roth) Kuntze, Physico-chemical properties, unsaturated fatty acids, chromatographic analysis.

### INTRODUCTION

*Vallisneria spiralis* (Roth) Kuntze (Family: Apocynaceae), local name: Agarmoni, Bread flower, is a tall climbing shrub which is locally used as medicinal plant. It is native in India and Burma and also found in Sylhet in Bangladesh. It is traditionally used for sores and wounds. Barks are chewed for fixing teeth<sup>1</sup>. Previous research revealed that it contains a mixture of glycosides vallarisoside and a known one, 3 $\beta$ -O-( $\alpha$ -acofriosyl) along with a known one glycoside, benzyl 2-O- $\beta$ -apiofuranosyl-(1 $\rightarrow$ 2)- $\beta$ -D-glucopyranosyl-2<sup>2</sup> and also O-acetyl-solanoside (O-acetyl-acofreosyl digitoxigenin)<sup>1</sup>. *Vallisneria spiralis* seeds yield 33.0 % of unsaturated oil<sup>3</sup> but there is no report on the chemical composition of the oil from its root bark. In this work, an attempt was made to justify the traditional uses as per scientific experiment. Findings of preliminary investigation which include extraction, various physical and chemical parameters and toxicity studies are reported in this communication.

### MATERIAL AND METHOD

Root bark of *Vallisneria spiralis* were collected from the climbers grown road side in Santala Devi forest, Dehradun and duly authenticated by Botanical survey of India, Dehradun. The root bark were separated from the roots and shade dried, pulverized to coarse powder and subjected to hot extraction with petroleum ether (60-80 $^{\circ}$ C) by soxhlet for 10-12 hrs. The orange yellow colored oil obtained from the extraction was analyzed to determine the physical constants like specific gravity, refractive index, acid value, acetyl value, saponification value, iodine value, hydroxyl value, peroxide value, moisture and volatile matter and unsaponifiable matter of the oil, using standard methods of Indian Pharmacopoeia<sup>4</sup> and results are given in **Table 1**.

### Chemical Composition

The fatty oil was saponified by refluxing with N<sub>2</sub> Alc. KOH for about two hours. After removal of alcohol completely, the soap so formed was dissolved in distilled water and the unsaponifiable matter was extracted with diethyl ether. Fatty acids contained in the aqueous layer were regenerated by adding dil. Hydrochloric acid and extracting with diethyl ether. The ethereal extract was washed several times with

water, dried over anhydrous sodium sulphate. On removal of the solvent, a mixture of mixed fatty acids was obtained. The fatty acids obtained were converted to their methyl esters by refluxing with methanol (dry) in the presence of sulphuric acid. The mixture of the methyl esters was analysed using a Netco Gas liquid Chromatograph (GLC), fitted with FI detector and 10% diethylene glycol succinate (DEGS) on caromone, WHP column (3m x0.3cm) at 160 $^{\circ}$ C, using nitrogen (4kg/cm<sup>2</sup>) as carrier. The peaks were identified by comparison of their retention times with those of authentic samples and by co-injection. The fatty acid composition of the oil is given in **Table 2**.

### Toxicity Studies

The toxicity studies of the oil were carried out on albino rats of either sex, weighing between 150-200g. Two groups of animals, each containing 8 rats, were given the oil at a dose level of 3ml/kg and 5ml/kg body weights of rats orally. None of the rats showed any toxic effects of mortality for 12 hrs.

**Table 1: Various Physico Chemical Properties of the Fixed Oil Extracted From Root Bark Of *Vallisneria Solanaces***

Physio-chemical properties	Value
Yield of oil	30%w/w
Specific gravity	1.0745 at 25 $^{\circ}$ C
Refractive index	1.5675 at 25 $^{\circ}$ C
Acid value*	9.205
Saponification value*	93.3634
Iodine value*	107.43
Acetyl value*	466.53
Hydroxyl value*	27.65
Peroxide value	Not appeared
Unsaponifiable matter	0.3261
Moisture and volatile matter	0.0788
Freezing point	5-6 $^{\circ}$ C

**Table 2: Fatty acid composition of *Vallisneria solanacea* root bark oil**

Fatty acid	%
capric acid	15.0957
lauric acid	0.0086
palmitic acid	37.8001
erucic acid	0.0120
arachidonic acid	42.4008
caprylic acid	0.7412
Oleic acid	0.0182
Linolenic acid	0.1705

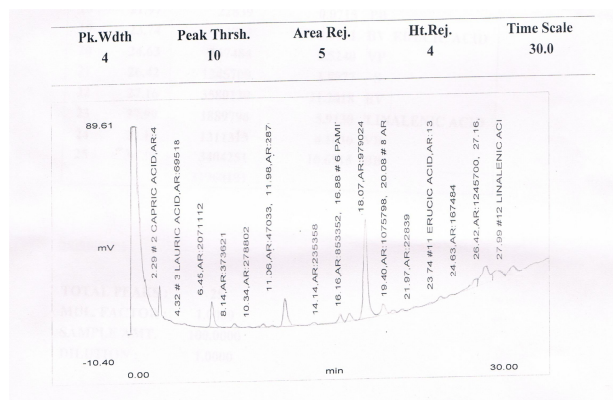


Figure 1: Analysis: Percent on area (Method file: MET, System: GC)

## RESULT AND DISCUSSION

The various physico-chemical properties of the extracted oil of *Vallisneria spiralis* root bark are given in **Table 1**. The oil has low unsaponifiable matter. Fatty acid composition, as given in **Table 2**, reveals that the oil is rich in palmitic acid and arachidonic acids (37.8001 and 42.4008% respectively) while capric, lauric, erucic, caprylic, Oleic and Linolenic acids (15.0957, 0.0086, 0.0120, 0.7412, 0.0182, 0.1705% respectively) are present in less concentration. The oil up to 5ml/kg body weight of rats given orally, did neither show any toxic effect nor any allergic reaction for 12 hours. Thus these results indicate that the oil is suitable for edible purposes.

## CONCLUSION

The studies given in the present investigation indicate that the root bark is rich in the oils (30%). The oil being rich in unsaturated fatty acids (essential requirement of human diet), contains saturated fatty acids in good proportion and is non-toxic on animal experiments. All positive factors indicate the suitability of the oil for its use for edible purposes. As root bark are available in abundance, organized efforts towards collection, drying and extraction are needed to utilise the important raw material for economic progress and further research may be carried out to evolve suitable methods of refining the oil to marketable grade.

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