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## Determination of physio chemical analysis and fatty acid composition of some plant seeds oil

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### Abstract

This paper describes the Physio-chemical analysis and the fatty acid composition of three seed oil collected from Chhattisgarh. It includes *Peltoforum ferrugineum*, *Prosopis juliflora* and *Parkinsonia aculeata*. Seeds are collected and studied for their component fatty acid and physiochemical characteristics. Various chromatographic techniques revealed the presence of palmetic, stearic, oleic, linoleic and linolenic acid. Atomic absorption spectrophotometric analysis of seeds indicates the presence of Fe<sup>++</sup>, Mn<sup>++</sup>, Cu<sup>++</sup> cations in it.

**Keywords:** Fatty Acid, physiochemical composition, seed oil

### Introduction

Chhattisgarh is one of the largest tribal state and declared as herbal state. About 44% of the total geographical area of state is forest and the forest is mainly of two types i.e. Tropical moist deciduous forest and tropical dry deciduous forest. Local people generally use different part of the local growing plant for the medicinal purpose (Firewood Crops 1980) [4]. The plant seed are rich source of oil & fats. Oil fats are composed of glycosides oils & fats are rich source of energy.

*Peltoforum ferrugineum*, *Parkinsonia aculeata* and *Prosopis juliflora* all belong to family leguminosae. *Peltoform ferrugineum* has wide medical purpose. Its different parts are used for dysentery. It is used as astringent also. Its seeds are used for treatment of insomnia. All parts of the plant of *Parkinsonia aculeata* are reported to be used as antipyretics. The leaves are considered diaphoretic. *Prosopis juliflora* is a remedy for cataract cold, dysentery, flu, headache, inflammation; itching and stomach ache Chopra *et al.* (1956, 1960) [2, 3].

### Experimental

Seeds are collected, dried, cleaned and powered. The powered seeds are refluxed with petroleum ether (60-80) using soxhlet apparatus for 8-10 hrs and oil is extracted. The oil is used for different physiochemical analysis. Mixed fatty acid and methyl esters solution were prepared by refluxing with methanol having 1% sulfuric acid. The solution is used for GLC analysis.

Physicochemical characteristics were determined by AOCS method (A.O.A.C 1980) [1].

GLC analyses were carried out with fast chromatography model of MS Auto system XL Parkin Elmer.

### Result and Discussion

The physicochemical analysis of seeds and seed oil (Nnamdi *et al.* 2014) [5] of *Peltoforum ferrugineum*, *Prosopis juliflora* and *Parkinsonia aculeate* are tabulated in Table 1-5 given below.

**Table 1:** Physicochemical Analysis of Seeds (%)

S. No	Name of Seeds	Oil	Moisture	Ash	Organic matter (100-Ash %)
1	<i>Peltoforum ferrugineum</i>	8.14	4.93	5.11	94.89
2	<i>Parkinsonia aculeate</i>	5.31	5.80	2.12	97.88
3	<i>Prosopis juliflora</i>	2.51	5.59	3.53	96.47

**Table 2:** Nutrient Composition of Seeds (%)

S. No	Name of Seeds	Protein(P)	Fat(L)	Fibre(F)	Carbohydrate 100-(P+ L+ F+ ash)%
1	<i>Peltoforum ferrugineum</i>	24.31	3.41	5.78	61.57
2	<i>Parkinsonia aculeate</i>	18.31	5.31	8.89	65.37
3	<i>Prosopis juliflora</i>	15.62	2.51	3.01	75.33

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**Table 3:** Micro Nutrient Content of Seeds (PPM)

S. No	Name of seeds	Fe	Mn	Zn	Cu
1	<i>Peltoforum ferrugineum</i>	63	131	52	12
2	<i>Parkinsonia aculeate</i>	51	17	31	7
3	<i>Prosopis juliflora</i>	4982	37	75	19

**Table 4:** Total fatty acid composition of seeds OIL (%)

S. No	Name of seeds	Saturated fatty acid	Total unsaturated fatty acid	Remarks
1	<i>Peltoforum ferrugineum</i> *	-	-	-
2	<i>Parkinsonia aculeate</i>	12.62	81.14	13.69 mono unsaturated fatty acid+67.45PUFA+ 5.66 unidentified fatty acid
3	<i>Prosopis juliflora</i>	18.49	73.87	22.09 mono unsaturated fatty acid+51.08 PUFA+ 6.92 unidentified fatty acid

\*Higher fatty acid are absent in *Peltoforum ferrugineum*.

**Table 5:** Fatty Acid Composition of Seeds Oil (%)

S. No.	Fatty acid	<i>Peltoforum ferrugineum</i>	<i>Parkinsonia aculeate</i>	<i>Prosopis juliflora</i>
1	Pamitic acid	-	8.21	13.37
2	Staric acid	-	4.41	5.12
3	Oleic acid	-	13.69	22.09
4	Linoleic acid	-	25.38	1.11
5	Linolenic acid	-	42.07	50.67
6	Behenic acid	-	-	-
7	Unidentified acids	-	1.58 4.08	1.33 2.30 2.29 1

Table-1 shows the physiochemical properties of the seeds like percentage of oil, moisture, ash and organic matter in the seeds (Nnamdi and Ebele 2014) [5]. It shows that *Peltoforum* has maximum oil percentage (8.14%), moisture and ash content is low in all seeds. *Prosopis juliflora* has maximum organic matter content (96.47%). Table-2 shows the nutrient composition of the seeds. The table shows the composition of protein, fat, fiber and carbohydrate composition of the seeds. It shows that *Peltoforum ferrugineum* has maximum protein content (24.31%), *Parkinsonia aculeate* has maximum fat and fiber content (5.31%) and (8.89%) respectively while *Prosopis juliflora* has maximum carbohydrate content (76.74%). Table-3 shows the micronutrient content of the seeds. The micronutrient are Fe, Mn, Zn, and Cu. The table shows that *Prosopis juliflora* has maximum Fe content (4982ppm), *Peltoforum ferrugineum* has maximum Mn content (131ppm) while *Prosopis juliflora* has maximum Zn (75ppm) and Cu (19ppm) content.

Table-4 and Table-5 shows fatty acid composition of the seed oil (Warra et.al 2012) [6]. Total saturated fatty acid is content of palmetric, steric acid and behenic acid. Higher fatty acids are absent in *Peltoforum ferrugineum*. Steric acid varied from 1.07-13.37. Total unsaturated fatty acid varied from 10.11% to 50.64%.

Linolenic acid is high in *Parkinsonia* while oleic acid is highest content in *Prosopis juliflora*. PUFA (Linoleic and linolenic) is high in *Parkinsonia* (25.38 +42.07).

## Conclusion

The seeds have low oil percentage. Low ash and moisture content shows good quality of seeds. The seeds have high percentage of carbohydrate hence nutritive. They are good source of micro nutrient. The major fatty acid found is palmetric, steric, oleic, linoleic and linolenic acid. On the basis of fatty acid composition we found that *Prosopis* is rich in linoleic while *Parkinsonia* are rich in linolenic acid. *Parkinsonia* is rich in PUFA contents (67.45%) and PUFA is good cholesterol help to reduce the chances of various heart diseases, gastro intestinal disorder and several cancers. Industrially, the oil may be useful in soap, cosmetic and candle making. It is also suitable for incorporation in livestock feed.

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