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PHYSICO-CHEMICAL COMPOSITION OF FIXED OIL FROM *RICINUS COMMUNIS* L.

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ABSTRACT

The oil extracted with hexane from the seeds of locally grown *Ricinus communis* L. was analysed for its physico-chemical constants and the fatty acid composition. It was found to be non-drying oil comparing favourably well with oil from plants grown in colder climate but less unsaturated than Russian oil. It was also observed that the oil was of fair standard and could be used in place of oil from other *Ricinus* spp.

INTRODUCTION

Caster oil is extracted from the seeds of the plant, *Ricinus communis* L. found wild and cultivated in most tropical and sub-tropical regions. It is mainly cultivated in USSR, Brazil, India, Thailand, Romania and Bulgaria. In Pakistan it is found both wild and cultivated in N.W.F.P., Balochistan, Sindh and Punjab (7,9).

Caster oil is nearly colourless or pale yellow, having high density and viscosity which determine its property as a high quality

lubricant(6). This oil is largely employed in the manufacture of paints, varnishes, imitation leather, sticky fly-paper, typewriter ink, transparent and textile soap and in the production of brake fluid (6,7). It is also used as a simple purgative in all delicate conditions for children and adults (3,4). The seed cake, which is very poisonous, is used as fertilizer (6,7,10).

It has been reported that the seeds of the plant, *Ricinus communis* L. and *Ricinus chervonnaya* grown in USSR contained 50-55% and 68.2-74.3% fixed oil respectively (7). It was also reported that the seed of *Ricinus communis* L. contained 70-80% of kernel and 30-55% of fixed oil (6).

A sample of oil from *Ricinus communis* L. was examined and it was reported that it had the physico-chemical characteristics within the following limits; specific gravity at 15°C, 0.958-0.968; iodine number, 82-90; saponification value, 177-187; unsaponifiable matter, 0.3-0.7%l; refractive index, at 25°C; 1.4790-1.4813; and acetyl value, 143-150(6,7).

Ricinus communis L. grows generally on deep red sandy and clayey loams, alluvial loams, and even on rough gravelly lands(22,7). It thrives best in sandy soil. It has also been shown that on optimum water supply to plants, the weight of 100 seeds increased by 26-27 grams and oil content increased on an average by 5.7% when c ompared with unirrigated castor plants.

The present study was carried out to find the yield, physico-chemical characteristics and the fatty acid composition of oil from the seeds of indigenous species of *Ricinus communi* L. and to compare it with oil from exotic species in order to explore the possibility of its industrial utilizlation.

MATERIALS AND METHODS

The fruits of the castor plant, *Ricinus communis* L. were collected from Thai area of Hazara Forest Division. They were dried in shade and the shells were separated from the kernels. The kernels were crushed using mortar and pestle and the oil was extracted from the crushed kernels with the help of a Soxhlet apparatus using hexane as solvent. It was purified by treating with activated charcoal in the proportion of 4:1 by weight (6).

The mixture of oil and charcoal was exposed to sun rays for a long time usually 15 days. Impurities were absorbed by the charcoal and on filtering refined oil was sobtained (8). The physico-chemical charactelristics of the oil were determined following the standard methods reported in literature (1,5,6). Fatty acids composition of the oil was estimated using fractional precipitation and crystillsation techniques (7,9).

RESULTS AND DISCUSSION

The yield of oil from the seeds of *Ricinus communis* L. was found to be 52%. It compared favourably well with the oil yield (50-65%) redported (7) and with that exotic species of *Ricinus communis* L.(35-55% of an (6). The oil yield was low as compared to that of *Ricinus chervonnaya* (68.2-74.5%). It appears from the comparative study that the oil possesses a sound commercial viability. The resuslts of various physico-chemical constants are compared with results reported by other investigators in Table 1.

The quantitative value of the fatty acid content are also identical with the unsaponifiable matter and recinoleic acid percentage and lie within the general range of 0.3-0.7% and 80-92.3% aresspectively for the oils from colder habitate Table 2.

Table 1. Physico-chemical characteristics of *Ricinus communis* L. oil as compared with exotic species.

Sl. No.	Name of the constant	Lab. work	*R.communis* L. (reported.7)	*R.zanziberinus* (reported.6
1.	Specific gravity at 25°C	0.9637	0.953 - 0.964	--
2.	Refractive index at 25°C	1.4780	1.4695- 1.4730	1.4788
3.	Saponification value	179	177 - 187	179.2
4.	Acid value	3.5	4.0	--
5.	Iodine value	85	82-90	88.4

Table 2. Chemical composition of oil of *Ricinus communis* L. as compared with oil from exotic species.

Sl. No.	Name of constituent	*R.communis* L. (Lab.sork) %	*R.communis* L. (reported.7) %	*R.zanziberinus* (reported.6) %
1.	Saturated fatty acids	5	-	0.5
2.	Unsaturated fatty acids	95	-	99.5
3.	Unsaponifiable matter	0.7	0.3 - 0.7	-
4.	Recinoleic acid	89.0	80.0	92.3
5.	Oleic acid	6.4	9.0	-
6.	Linoleic acid	-	3.0	6.6
7.	Stearic and dihydroxy shearic acid	-	3.0	-

CONCLUSION

With a comparatilvely low oil yield i.e 52% as compared with 68.2-74.5%s of the *Ricinus chervonnaya*, a Russian sample, the oil from the indigenous source (*R. communis* L.) seems to show a bright qualitative picture, useful for its commercial exploitation in various iondustrial uses such as leather, textile, soap, brake fluid and as purgative in medicine

REFERENCES

ASSOCIATION OF OFFICIAL ANALYTICAL CHEMIST(1980). Official Methods of analysis 13th Ed. Washington D.G. P-437.

AIYAR,A.K. (1958). Field Crop of India, Banlore, PP.148-1.

BRITISH PHARMACOPOEIA (1953) "*Ricinus communis* L. "The Pharmaceutical Press 17-Bloomsburry square London WCI. P.128.

BRITISH PHARMACOPOEIA (1973) "*Ricinus communis* L." Her Majesty's Stationary Office London. P.86

JACOBS,M.B. (1962). The Chemical Analysis of Food and Food Products D. Van. Nostrand Co., London. P.44

JAMIESON,G.S. (1943). Castor oil. "Vegetable Fats and oil" 2nd Ed. Reinhold Publishing Corporation. New York, Pp.47-55.

MOSHKIN,VA (1986). "Castor". Amerind Publishing Co.Pvt. Ltd.,New Dehli. Pp.65-80.

NADKARNIS,A.K.(1954). "*Ricinus communis* L." Indian Materia Medica Vol.I. Popular Book Depott. Bombay Pp.1065-1067.

ROSENTHALAR,L.(1930). "Separation of the saturated from Unsaturated Fatty Acids". The Chemical Investigation of Plants. G.Bell and Sons, Ltd.London. P.82-86.

ZAMAN,M.B. and M.S. KHAN (1970). "*Ricinus communis* L". Hundred Drug Plants of West Pakistan, Medicinal Plant Branch Pakistan Forest Institute,Peshawar. P. 59.