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EXTRACTION AND CHARACTERIZATION OF OIL FROM SEEDS OF PINUS LONGIFOLIA (CHEER PINE)

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The oil was extracted from *Pinus longifolia* seeds and analysed for its physico-chemical constants and composition of fatty acids. The oil is edible and may be used in various industries like paints, varnishes etc. Based upon the chemical composition of oil cake, it seems quite suitable ingredient for poultry and livestock feed industry.

INTRODUCTION

The *Pinus longifolia* (roxburghii) commonly called "Cheer pine" is a subtropical forest tree. In Pakistan it predominantly grows in Azad Kashmir, N.W.F.P., Gilgit, Rawalpindi division and Baluchistan (Siddique, 1978). The exact annual production of its seeds is not available but it is hoped that the thick forests distributed over a large area in Pakistan would provide a huge amount of its seeds. A very limited amount of its seeds is used for germination purposes while the rest practically goes waste. Although, the collection of its seeds from mountainous forests seems difficult, but it is hoped that better utilization of seeds would make their collection economical. The seeds of other species of pinus genus have been successfully exploited for extraction of oils, which are mainly used for edible and Pharmaceutical purposes, and in paints and varnishes (Vaughan, 1970).

This piece of research was planned to study the percentage oil yield from the seeds of *Pinus longifolia*, its characterization, refining and to determine the chemical composition of oil cake.

MATERIALS AND METHODS

The seeds were procured from Forest Department of Bhimber, District Mirpur, Azad Kashmir and were washed free of extraneous material, then dried in an oven at 100°C to a constant weight. Seeds were shelled and percentage of kernels was determined. Oil from whole seeds and kernels was extracted with soxhlet apparatus using petroleum ether (40–60°) as solvent. Various

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physico-chemical constants of the oil and chemical composition of oil cake were determined by the usual standard methods recommended by A.O.A.C. (1965) and Rede (1966). Fatty acid composition of oil was determined with the help of iodine and thiocyanogen values of the oil (Jacobs, 1973).

RESULTS AND DISCUSSION

The percentage of kernels in seeds, was found to be 63 and moisture was 2.60% on the basis of kernels and 5.2% on the basis of whole seeds. The oil yield was 55% in kernels and 35% in seeds on dry basis. The various physico-chemical constants of the oil are given in Table 1. Tables 2 and 3 show the chemical composition of oil and oil cake respectively.

Table 1. *Physico-chemical constants of oil*

Physico-chemical constants	Crude oil	Refined oil
Specific gravity at 24°C	0.9214	–
Refractive index at 25°C	1.4713	1.4723
Viscosity at 25°C	340.07 millipoises	–
Acid value	2.36	0.18
Iodine value	136.41	–
Thiocyanogen value	84.00	–
Saponification value	192.5	–
Titre value	20°C	–
Elaidin test	Drying oil	–
Rate of drying	5 days	–
Optical density	0.30	0.265

The physico-chemical constants (Table-1) of the oil from seeds of *Pinus longifolia* fall within the range of the seed oils from other species of Pinus genus (Mutther and Rossie, 1918, Friedricks, 1919, Pigulevski Ivanova, 1934).

Table 2. *Chemical composition of oil*

Name of Constants	Percentage in oil
Saturated acids	7.5
Unsaturated acids	86.5
Nonsaponifiable matter	1.64
Oleic acid	25.41
Linoleic acid	57.36
Linolenic acid	3.59

The quantitative picture of the fatty acids contents (Table–2) is almost identical with the linoleic and oleic acid percentage within the range of 45–58% and 17.52–30.2% respectively for the oil from other species Pinus genus (Parkash *et al.* 1957 and Tsuchiya Okubo, 1961).

Table 3. *Chemical composition of oil cake*

Name of constituent	Decorticated oil cake %	Corticated oil cake %
Crude fibre	2.66	37.66
Protein	65.04	38.02
Calcium	0.77	0.51
Phosphorus	1.74	1.12
N.F.E.	21.90	15.05
Reducing sugars	0.85	0.56
Ash	10.40	9.27

The chemical composition of corticated and decorticated oil cakes as shown in Table–3, indicates that the two cakes are quite rich in protein having 36.02 and 64.04 per cent respectively. The corticated oil cake containing high fibre contents, 37 per cent is more suitable ingredient for livestock feed industry, while the decorticated oil cake having low fibre contents, 2.66 percent and high protein 65.04 per cent is an excellent ingredient for poultry feed.

LITERATURE CITED

A.O.A.C. 1965. Official Methods of Analysis, Association of Official Agricultural Chemists, Washington.

Friedrichs, O.V. 1919. Conifer oils, oils from pine seeds. Svenk Farm. Tidskrift, 23: 445–51 (Chem. Abst. 14: 2059; 1920).

Jacobs, M.B. 1973. Chemical Analysis of Food and Food Products. 3rd ed. p. 375–80, Robert E. Krieger Publishing Co. Inc. U.S.A.

Matther, H. and W. Rossie. 1918. Pine seeds and pine seed oils. Univ. Jena. Arch. Pharm. 256: 289–302 (Chem. Abst. 13: 14011: 1919).

Parkash, O., T.R. Sharma and A. Sattar. 1957. Fatty acid composition of Himalayan pine (*Pinus griffithii*). J. Proc. Oil Technol. Assoc. India, 13: 47–51 (Chem. Abst. 53: 17540b: 1959).

Pigulevski, G.V. and M.A. Ivanova. 1934. A new vegetable oil from seeds of

Pinus pumila. J. Appl. Chem. Russia 7: 569–71 (Chem. Abst. 29: 20079: 1935).

Rede. C.V. 1966. Laboratory Hand Book for Fat Analysts. Academic Press Inc. London.

Siddique. K.M. 1978. Report of production of seeds of Pinus roxburghii in different regions of Pakistan. Pak. J. For. 28(3): 157.

Truchiya, T. and O. Okubo. 1961. Seed Oil of *Pinus pumila* Kobyo Shikensho Kogyo 59(9): 385–8 (Chem. Abst. 61: 16317f: 1964).

Vaughan, J.G. 1970. The structure and utilization of oil seeds. p. 106-107 Chapman and Hall Ltd., London.