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SCIENTIFIC UTILISATION OF INDIAN OIL-SEEDS

OIL-SEEDS form a valuable part of the annually recurring agricultural wealth of this country. Out of an estimated area of about 300 million acres of land under actual cultivation, forming roughly 25 per cent. of the geographical area of the Indian Empire, about 60 million acres are under oil-seed crops. Besides, the 90 million acres of Indian forests also yield, as minor forest produce, commercial quantities of important oil-seeds. The approximate acreage and annual output of the more abundant oil-seeds are given below:—

Oil-seed	Acreage in millions of acres	Output in millions of tons
Cotton	25·0	2·0
Groundnut	10·0	3·3
Mustard and rape group	7·0	1·0
Linseed	5·0	0·5
Gingelly	5·0	0·6
Castor	2·0	0·2
Cocoanut	1·4	1·4
Poppy	0·5	0·2

The less abundant, but nonetheless valuable commercial oil-seeds comprise Mowra, Nigerseed, Safflower, Kokum, Domba, Dhupa, Chaulmogra, Neem, Ritha, Cashew, Honge, Kusum, Hemp and many others.

The present annual output from all these sources may be roughly taken as 10 million tons, which may be approximately valued at 100 crores of rupees. One of the first questions which strikes a rational publicist in relation to this large annual output is how far this agricultural wealth has been harnessed to satisfy the demands of internal consumption or of a policy of sound national economic prosperity. At any rate, the proper utilisation of this precious raw material in the best interests of Indian agriculturists and their professional requirements is a responsibility which no enlightened government or patriotic businessman can shirk.

A rational plan of utilisation of oil-seeds should commence with a systematic assessment of the scientific value and industrial potentiality of the three main components of every commercially important Indian oil-seed, *viz.*, (1) the shells and husks, (2) the oils and fats derived from the kernels, and (3) the residual oil-cakes. Of these, systematic analyses have so far been mainly undertaken on the fatty oils prepared from the seeds or seed-kernels.

As many as 1,000 species of oil-seeds belonging to about 125 Natural orders of plants have been analysed for the content and characteristic properties of their oils and a few valuable guiding principles discovered, showing remarkable similarities

in the scientific and industrial potentialities of oils belonging to the same natural order of plants. It is needless for the purpose of the present article to describe in detail either the different modes of extraction of oils from oil-seeds or the variety of treatments and processes to which oils are subjected in the various industries connected with their multifarious utilisations at the present time. One need only peruse the following list of their industrial uses:—

(1) Refined salad and edible oils including hydrogenated vegetable ghees, (2) Toilet, Textile and Liquid Soaps including Turkeyred Oils, (3) Illuminating Oils. Candles and Liquid Fuels, (4) Glycerine and Explosives, (5) Paints, Varnishes, Lacquerware, and Plastics including rubber substitutes, (6) Shoe and Leather-dressing Greases and Polishes, (7) Simple and Compound Lubricants, (8) Linoleum and Waterproof Fabrics, (9) Medicinal Oils and Pharmaceutical Compositions, (10) Various Fine Chemicals including valuable Synthetic Perfumes.

This list is gradually expanding with the advancing scientific knowledge concerning fatty oils. Though a given oil may not be adaptable to every one of the above uses, it is possible by suitable treatment with physical and chemical processes, to utilise the product for several of the purposes. It is exactly in this direction that there is immense need and scope for a systematic investigation of the industrial possibilities of every indigenous fatty oil of commercial importance.

Compared to available scientific knowledge concerning fatty oils, that relating to oil-cakes is deplorably meagre. The industrial and scientific value of oil-cakes is in no way inferior to that of the related fatty oils. In some respects, their importance as edible foods, as cattle fodder, and as fertilisers is incomparably greater than that of the oils themselves. Many of them are in the first instance capable of yielding by suitable methods of extraction a variety of valuable fatty, glucosidic, alkaloidal, and resinous drugs and detergents, without affecting their further utility as rich sources of vegetable proteins, carbohydrates and mineral constituents. A systematic scientific investigation of our oil-cakes has unlimited scope and will amply repay the time and energy spent on it.

The position regarding the scientific knowledge of shells and husks of oil-seeds is even more precarious than that of oil-cakes. Sufficient is, however, known regarding a few of these, *e.g.*, cotton-seed hulls, cocoanut and cashew shells to warrant the prediction that many of these, on suitable treatment, may prove to be rich sources of phenols, of furfuraldehyde and of kindred chemicals, which are essential ingredients for a "synthetic plastics industry". The ashes of many of these hulls and shells are rich sources of valuable potash and phosphates. It is needless to stress the importance of a systematic research into their scientific and industrial potentialities. At present they are either used as cheap fuel or as doubtful fodder.

Properly utilised, the raw oil-seeds estimated at 100 crores of rupees can easily be made to yield a variety of finished products worth at least 500 crores of rupees. The above forecast is based on a review of several years of research experience with indigenous oil-seeds and related products. and it should convince our leading statesmen and industrialists that there is an urgent need in India to-day for one or more co-ordinated Provincial Institutes devoted exclusively to fundamental and systematic investigations into the scientific and industrial value of indigenous oil-seed products. Provision will have to be made for a periodical demonstration and dissemination of the resulting knowledge among our industrially gifted artisans through the media of local vernaculars.

Without such a concentrated endeavour and organisation on our part, our agricultural activities will only maintain our countrymen as permanent "Hewers of Wood and Drawers of Water", leaving the more remunerative aspects of the industrial utilisation of our raw materials in the hands of the more enlightened and actively organised industrialists of the other countries. One therefore trusts that our business magnates and administrators will rise equal to the occasion and enable Indian scientists to contribute their best for our national industrial prosperity.