Utilisation of Molasses.

A DISCUSSION on the utilisation of molasses took place at the meeting of the Chemical Section of the Indian Science Congress, on Monday, the 6th January 1936.

Dr. P. C. Guha, the President, in introducing the subject pointed out the great loss that molasses involve in sugar, amounting to something like 400,000 tons of sugar on the total production of molasses in the country and the consequent urgent need for utilising it profitably. He passed in review the various products for which molasses could be utilised, potable and industrial alcohol, fuel, acetic acid, acetone, butyl alcohol and glycerine, yeast, cattle feeds, manures and road binding material and briefly referred to the possibilities of each and to the work in progress in different parts of India in connection with them.

Dr. N. R. Dhar described how the addition to soil of carbon in the form of molasses leads to fixation of nitrogen. In the field as indicated by experiments at Allahabad and Shahjahanpur in the United Provinces and on the estates of Messrs. Parry & Co. in Madras, higher yields of sugarcane were obtained by the application of molasses at 90 to 270 maunds per acre. Rice has also favourably responded to manuring with molasses. To ensure the complete oxidation, it must be applied two or three months before planting sugarcane, the soil being frequently exposed by stirring and kept moist by irrigation. Molasses should not be applied to standing crops. Alkaline soils are benefited by the application of molasses and instances were quoted from the U. P. and Mysore in support.

Dr. Subrahmanyan stated that he found molasses toxic to crops in its first stages of decomposition but not so after a month. Under swamp conditions, lactic acid was the first product, followed by volatile fatty acids; considerable solution of ferrous iron and aluminium follows, which later on are precipitated or removed from solution. Fixation of atmospheric nitrogen does occur to some extent on direct application of molasses but it is wasteful of carbon. Fermentation with restricted air supply conserves the carbon and in conjunction with lime the application will lead to enhanced nitrogen fixation.

Dr. Chatterjee strongly advocated the manufacture of industrial alcohol for motor spirit and showed with the help of statistics that all the molasses produced by factories could be so utilized and urged the removal of the restriction on its manufacture. As there may be difficulties in introducing power alcohol throughout India, Dr. Chatterjee suggested that it should first be introduced in the U.P., which is the largest molasses producing Province. The cost of manufacture has been carefully calculated and falls within six annas per gallon. There are absolutely no difficulties in technical matters, regarding manufacture, distribution and wise supervision.

Sir Bryce Burt emphasised the need for greater efficiency in factories and scientific work to reduce the sugar content of molasses and its quantity. As regards motor spirit, this could not be manufactured at anything like the 3 to 4 annas which was the price of petrol at the ports without duty and distribution charges. He would strongly urge the scope for using it for cattle feed and manure and of experiments towards that end.

Mr. A. K. Yegnanarayana Aiyer (President, Agricultural Section) said that in the direct consumption of sugar manufactured now universal in India, molasses are a product of some value. The expensive and elaborate arrangements made by the recently formed exporting company, *viz.*, transporting to the rail heads at the different places on the banks of the Ganges, shipping to Calcutta in special tank steamers down the river, extensive storage tanks at Calcutta and ocean shipment to England, all involving heavy expense go to prove the fact. If it should be worth the while of an exporting company to do all this, it should be much more so for utilisation in this country itself for similar purposes, as we could save all the expense of this elaborate transport. Industrial alcohol will certainly form the most profitable method of utilisation, but reasons of fiscal, administrative, and legislative difficulties rule this method out for the present. Utilisation as manure and as a cattle feed present promising outlets for the product, as India has an abundance of neither the one nor the other and both are also crying needs in the country. Manuring directly for a cane crop has not yielded satisfactory results, but if a sunn hemp crop is grown as the first crop on molasses manured land a very heavy yield of green manure is obtained which can be ploughed in for cane. This indirect method of cane manuring has been the one found promising in Mysore, as far as present experience goes. The method of application and the difficulties of transport to the fields will prove somewhat serious obstacles. The need for weathering emphasised by Dr. Dhar which should go on for nearly three or four months will likewise constitute another difficulty, as also the very large doses which he recommends and which in practice are really much too large. For paddy, a one ton dose on alkaline land has yielded good results, and if this should be confirmed by further trials it will provide a very large outlet for molasses, notwithstanding transport and other difficulties. A line of even greater promise is that of making a cattle feed like molascuite, using groundnut husks and haulms as the filler. Groundnut deserves to be and will be grown extensively as a rotation crop with cane and very large quantities of these will be available. It will mean the utilisation of the by-products of groundnut cultivation and the by-products of the sugar industry benefiting both the grower and the manufacturer. At the same time it will give a great stimulus to the improvement of the cattle industry and of dairying, by providing a valuable and largely available supply of cattle feed. (The manurial experiments referred to relate to only one season and should be regarded therefore as tentative and not conclusive by any means.)

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*An article by Dr. N. G. Chatterjee on Power Alcohol, appears elsewhere (pp. 662) in this number.