TECHNOLOGICAL RESEARCH ON ARECANUT

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India is in short supply of arecanut, a commodity intimately associated with the everyday life of the common man and the rich; a commodity which is of great economic significance to the small land owners in Kerala, Mysore and Assam. Realising the importance of this commodity, the Government of India through the Indian Central Arecanut Committee has organised extensive programmes of increased production and research. As a result of these efforts the production of Arecanut in India is steadily going up and it is expected that it will soon be possible to stop import, which has already been cut to a great degree. Besides problems of production the Committee realising the fact that arecanut has not had in the past the benefit of the application of chemical and technological study, sponsored research on various aspects in different Universities, and have recently established a Technological Research Wing, in Collaboration with the Central Food Technological Research Institute. The results of these studies have brought out useful information which could profitably be used by the grower, processor, the trader and consumer. The results are discussed in brief and in a general way in this article.

Definition of Arecanut

Arecanut is consumed in a large number of trade varieties. There are over 160 trade types. They differ principally in their maturity and processing. The principal arecanut growing areas of Kerala and Assam consume the raw ripe nut, while the other major producing area Mysore consume a type known as *Kali adaka*, made by cutting, boiling and drying the mature green nut. The other areas in the South utilize the boiled and dried mature green nut, while the rest of the country use the dried ripe nut known as *Chali Supari*. A commodity with such widely varying utilization requires a more detailed evaluation of its constituents for the differenciation and defining of even the major trade types. No detailed information on the chemical composition of the many trade types, was available. Analysis of large number of samples of typical trade types have been undertaken and a pattern of physical and chemical characteristics is being worked out correlating the analytical work and the traditional grading in the markets. Recently the Agricultural Marketing Directorate has evolved certain groupings and quality gradings. These samples have also been analysed and will be taken for purposes of correlation. Out of these it is expected that standards both minimal and optimal will emerge which will enable the consumer to get his money's worth.

Storage of Fresh Ripe Arecanut in husk

As mentioned already the two major arecanut growing areas, Kerala and Assam prefer chewing the fresh ripe arecanut. This stage is liked so much for its flavour

and taste that rather primitive methods of storage have been practiced for providing nuts in the off-season. The methods result in heavilly infected, foul smelling retted and unattractive fruit with the edible nut inbibing all the bad qualities. The product is very unhygienic. As a result of extensive scientific study of many storage methods, a new concept of storage by preservative steeping has been found which preserves the arecafruit in its fresh condition for as long as eight to ten months. Though the laborotary work has complex and extended, a schedule easy to follow and applicable at the village level has been described. Field trials of the storage in different easily available containers such as coated mud pots, cement tanks and glazed earthenware jars have been successfully done over the last two years and the product evaluated in regular markets. These were accepted as equal to the fresh fruits in the off-season and obtained the same high price as fresh fruits. Further modification of the principle is being worked out seeking still simpler conditions and greater safety. It is expected that the new principle of storage could be extended to certain other fruits and vegetables.

Processing of Arecanut

After harvest, the arecanut in husk is processed by the traditional methods, which yields final products vastly different in taste, flavour and other chewiug characteristics. Any attempt to standardize and improve the traditional processing obviously has to know the physical and chemical characteristics of the raw meterial and the changes in these characteristics during processing. Besides, the use of the raw meterial at varying maturities, necessitates the study of the changes in the characteristics in the course of maturation. These studies have been carried out covering three to five stages of maturity and different arecanut growing areas. Differences in the polyphenol, popularly known as 'tannins', and alkaloid contents of nuts from different regions have been observed. Besides smaller variations in the fat and polysaccharides were also found. Studies of changes with maturity has shown that polyphenols are formed fairly early while the other constituents gradually increase upto the full maturation stage. The rather strong physiological action of tender nuts would indicate that the arecanut polyphenols contribute to a marked degree to the physiological action in addition to the well known effects of the alkaloids of arecanut. Further physiological and pharmacological studies might show a possible use of these polyphenols.

During drying of ripe arecanut or boiling of green nuts the essential changes are the removal of moisture and modifications of the polyphenols both quantitiatively and qualititively. The pattern of these changes have been studied, while the changes in physiological effects remain to be done. These studies show the way to standardization of the processing techniques so that reproducible quality products could be made.

Another important step towards standardization of processing techniques is the design and fabrication of a Boiler-cum-Drier, a compact unit for controlled processing of arecanuts of different maturity. The equipment has been designed with an eye for ease of making, low capital cost, ease of working and at the same time yielding uniform quality product at an economic cost, equal if not better than the best product obtained by the traditional processes. The Boiler-cum-Drier has already been through restricted field trials and further field trials are planned for a coming season. The development of this equip-

ment is a useful achievement significantly for areas such as Assam and Kerala where sun-drying is not possible at certain periods of the year.

Storage of processed and dried arecanuts

Problems connected with storage of the different types of processed arecanuts are different. The *Kalipak* the green nuts cut, boiled, coated and dried acquire a darker shade or a dull shade with fungus infection when stored in humid areas. The scented *supari* suffers from the same defects and in addition looses the flavour and aroma characteristic of the product. This necessitates large-scale transfer of the finished product from centres of production to drier areas of restrict processing and sales to drier areas.

Detailed equilibrium, relative humidity and packaging studies of different types of arecanuts have been completed and as a result, definite recommendations made for packaging which will avoid transfer of the product and expand the markets to humid areas also.

The dried ripe nut, *Chali Supari*, is suceptible to insect attack and consequent wastage and deterioration of quality. There is much evidence of this type of wastage in a restricted survey of the market samples. The primary and secondary infestation have been studied and simpler fumigation treatments as alternative to the fumigation by burning sulphur have been found.

Adulteration of Arecanut

As with many products in short supply, adulteration is practiced with certain trade types of the arecanut, where it assumes serious proportions. The principal adulterant is the nut of another palm (*Caryota urens*), popularly called sagopalm. The problem has been studied in some detail and though by microscopy and physical and chemical examination, sagopalm nut could be detected, no simple easily practicable test has yet been found.

Utilization of By-products

The most important by-product of the arecanut industry is the husk from the ripe and mature green fruits. In view of their cellulosic nature, the efforts at utilization has been as with other fibrous meterials, for making paper and boards. It has been shown that it is possible to make a fairly good grade brown wrapping paper from areca husk and that the strength properties could be improved by admixture with banana stem fibre, another cellulosic raw material available in the same area. Other possibilities of utilization of the husk and the problems involved in the small scale and large scale utilization is also under examination.

Kali, the concentrated extract of the green nut is another by-product available to some extent. This concentrate of condenced polyphenols could after suitable treatment be used for tanning. However, the individual small scale processing and indifferent storage and consequent damage due to fungus attack, results in a non-uniform and poor product. Howeaver with controlled processing in the Boiler-cum-Drier on a fairly bigger scale and safe storage it is hoped this by-product could be made available as a quality product in quantity.

Physiological and pharmacological Effects of chewing:

Pan Supari chewing has been in vogue for thousands of years over a large part of South East Asia. As with many of our old established practices, this also has been endowed with a number of beneficial effects in old literature. At the same time as with

many of the ancient things, this practice has also come under severe criticism under the impact of western ideas. Since both viewsare likely to be exaggerated, a scientific study of the effects of chewing is necessary.

It is true that the study of a natural product is very complicated, especially when the effect produced is something difficult to objectively measure. But our modern knowledge of plant constituents and their individual physiological and pharmacological effects, makes it possible to usefully investigate the physiological and pharmacological effects of *pan supari* chewing. It is hoped that this study will show further possibilities of using the effective constituents in newer products such as stimulant preparations.

Conclusions

Several useful results have already been obtained, which should be made widely known for the benefit of the producer and the consumer. The wide use of the steeping technique for storage of the ripe areca fruits in the growing areas will assure a uniform high quality product to the consumer throughout the year and an assured good price to the producer. The market for this product is also likely to spread to other areas. The wide use of the Boiler-cum-Drier will similarly yield uniform quality good products bringing better returns to the producer and consumer alike. The use of larger driers by forming Co-operatives will also result in further economic production and help cut down the very large number of varieties, thus making it easy for grading and quality control.

Similarly the application of the result of storage and packaging of processed and scented nuts will avoid loss of quality, damage due to fungus attack and increase the market for these types.

These are other results which can be applied on a practical scale by persons with enterprise. Under this category comes the results achieved on the utilization of areca husk for paper and board both of which is in short supply in this country.

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