

Symposium on Plantation Crops and their Role in New Economic Scenario

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A symposium on "Plantation Crops and their role in new economic scenario" was organised during 48th Annual Conference of the Indian Society of Agricultural Statistics on 15 December, 1994 at the College of Veterinary and Animal Sciences, Kerala Agricultural University, Mannuthy, Thrissur. Dr. O.P. Kathuria welcomed the Chairman of the symposium. At the very outset the Chairman thanked the Society and the organisers for inviting him to preside over the symposium. He stressed the importance of role of Plantation Crops both in national and international economy. He observed that the subject is too vast and each crop covered under 'Plantation Crop' has its own problems and needs to be discussed separately. However the basic issues are common and role to be played by statisticians in handling methodological problems is basically the same. The symposium should address itself to provide some guidelines in identifying parameters required for objective estimation of yield, losses at various stages as well as suggesting improvement in marketing strategy. After the chairman's introductory remarks, the convenor Dr. O.P. Kathuria gave the outline of the papers being presented. Thereafter the participants were invited to present their papers. In all 9 papers were received covering various aspects of the coconut, cashew, pepper, coffee, rubber and spices. Since the authors of a few papers could not attend, Dr. O.P. Kathuria presented the salient findings contained in those papers. The extended summaries of all the papers are as follows :

1. Coconut Value Addition and By-product Development

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Coconut is referred to as "Tree of heaven", "Tree of abundance", "Tree of Life" and "Kalpavriksha". This crop occupies a unique position in the Socio-economic structure of the country and it is intimately related to the rural economy of a vast multitude of small and marginal growers especially

along the coastal states of this country. Above all it is a food crop as well as an oilseed.

The crop is now grown in an area of 1.5 million hectares with an annual production of 10 billion nuts. Although coconut is grown mainly for its nut it provides many a by-product of immense utilities and industrial application. Every part of the tree has its own use or application.

Trend in Area, Production and Productivity

India accounts for almost 18 per cent of the world's total coconut production and it is the third largest coconut producing country in the world. In India coconut cultivation is mainly confined to the coastal states. The all India coconut estimate indicates that 91 per cent of the total area and production of coconuts in the country is concentrated in the four southern states namely Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. Coconut is essentially a small holders crop in the country and it is grown mainly in homestead gardens and small holdings. There are about 5 million coconut holdings in the country with 98% of such holdings having a size below 2 hectares.

Coconut Industry Vs. Indian Economy

The coconut industry in Indian sustains roughly 10 million people in cultivation, processing, trade, transportation and other related activities. To the national economy, coconut makes significant contributions. The total value of production of the crop is around Rs. 4000 millions and foreign exchange earning is around Rs. 1000 millions through export of coconut based products, a major portion being coir and coir products.

In India as much as 60% of the coconut production is estimated to be used for edible and religious purposes, 3.5% as tender coconut, 35% as milling copra for oil extraction and the balance is processed into products like desiccated coconut. The coconut based economy in the country as such is dependent on a single coconut commodity i.e. the coconut oil. While a number of coconut kernel based products have been developed in other coconut growing countries such as coconut milk, coconut milk powder, desiccated coconut, skim milk, milkshake, Nata-de-coco, etc., our country lags behind in the post harvest processing sector. Even though India is the third largest coconut growing country in the world, its contribution to the export market has been insignificant. Except coir no other coconut product figures in the export list on a significant level. Among the major byproducts, coconut husk alone is processed into coir and coir products on a commercial level. The commercial utilization of coconut shell, coconut water and coir pith for the manufacture of products like shell

charcoal, shell powder, activated carbon, coconut water beverage, coconut vinegar and coir pith briquettes is slowly gaining momentum in India. Of late, the coconut shell has captured the attention of the Western world which is slowly discarding the synthetic non bio-degradable packings and containers of foods and beverage items and reverting in for natural bio-degradable packing materials. According to a recent issue of the World Food Regulation Review, European countries like Germany, France, Netherlands and Austria are already in the process of enacting legislative measures to curb and minimize the visible waste and is now encouraging use of bio-degradable packagings for food stuffs and beverages in place of synthetics now under use. Export potential of the coir pith in briquette form is very bright especially due to the ban on mining of peat in some of the European countries as an environment protection measure. This would not only help earn the much needed foreign exchange for the country but also help generate employment opportunities in the rural sector besides stabilizing the coconut economy in the long run. Likewise the utilization of coconut water as soft drink, for vinegar production and to produce Nata-de-coco would help reduce the productive cost of the main kernel based products. The yield and quality of copra vary depending on the maturity of the nut, variety, season of harvest, age of the palm, period of storage and agro-climatic conditions. Annual production of copra in the country is around 5 lakh tons, of which more than 10 per cent is ball copra. Production of ball copra is mainly concentrated in Karnataka and Tamil Nadu, whereas the bulk of the milling copra originates from Kerala.

Copra is the richest source of vegetable oil. On dry weight basis, copra contains 65-70 per cent oil. There are mainly two processing routes for oil extraction. One is the dry processing through the copra route and other is the wet processing through the coconut milk route. The former is the usual method adopted in our country. Extraction of oil through the copra route is usually released in 'chekkus', rotaries and expellers. In India there are about 1,439 oil establishments consisting of about 121 expeller units and 1,318 rotary units. Seventy six per cent of these units are located in Kerala. Also 50 per cent of total production of oil in the country which is around 3.25 lakh tons originates from Kerala State.

Desiccated coconut is the grated or shredded form of coconut meat. It is mainly used in biscuits, confectionery, bakery and other food industries. The process involves shelling, paring (removal of testa), disintegrating, drying, sieving and packing. The present total annual production of D.C. is estimated at about 15,000 tons. All the D.C. units in the country are in the small scale sector with capacities ranging from 0.5 to 1 ton per day. This industry provides employment to more than 1,500 people on a regular basis.

Coir with an estimated GDP of Rs. 250 crores is an important agro-based cottage industry. It is a highly labour intensive industry covering wide range of activities including collection of husk, retting, fibre- extraction, spinning and manufacture of coir and coir products. Coir industry in India supports around half a million people belonging to economically weaker sections of the rural population. About 80 per cent of the workers in the coir industry are women. Coir industry produces wide range of products from coir fibre and coir yarn such as doormat, coir mats, mattings, rugs, coir rope, curled coir, rubberized coir products. etc. Coir fibre is the most durable natural fibre in the world. Among the coconut products and by-products, coir and coir products earn valuable foreign exchange to the tune of around Rs. 100 crores by way of export. Hence there exists a vast scope for fuller exploitation of this raw material, the coconut husk.

Emerging Technologies in the Processing Sector

A new method of oil extraction from fresh coconuts wet processing of coconut was developed a few years ago. This oil is clear, nutritious and due to its low fat content it has long shelf life and can be used for cosmetic, pharmaceutical and domestic purposes. The premium products derived from the process makes it economically viable for a minimum capacity of 50,000 nuts per day. A plant, processing 1 lakh nuts per day can produce 7.5 tons of virgin coconut oil, 0.8 ton of brown coconut oil from testa, 9 tons of medium fat desiccated coconut, 11.5 tons of coconut water, 16.5 tons of skimmed milk, 21 tons of fibre and 27.5 tons of coconut shell on an annual basis.

Coconut cream is the concentrated milk extracted from fresh matured coconut kernel. This is a 'ready to use' product which can be either used directly or diluted with water for various preparations like curries, sweets, desserts, puddings ice-creams, soft drinks etc. It could also be used in the manufacture of bakery products and for flavouring food stuffs. Processed and packed coconut cream has a shelf life of six months or more and once the container is opened it should be stored in refrigerators for subsequent use.

Fresh coconut milk has many applications in household and food industries. Spray dried coconut milk powder is a recent product marketed in Philippines, Malaysia, etc., in laminated foil bags. Other products of commercial value made out of coconut milk are coconut syrup/jam and coconut honey. Another promising coconut milk base product is the skim milk power. It is a valuable commodity in the food and beverage industry.

Coconut shell products

Coconut shell is a natural product made up of hardened cellulose. On dry wt. basis coconut shell has the composition: Cellulose 33.01%, Lignin 36.51%, Pentosans 29.29% and Ash 00.61%. Of the enormous quantity of shells produced annually in India, the bulk is mainly used as fuel in copra making units, households, laundries, smitheries, bakeries, lime kilns, brickyards, iron foundries and other local industries requiring such fuel. The other commercial uses of shells in the country is for the manufacture of shell powder and shell charcoal. The shell charcoal which was a relatively minor product in the past has now emerged as a major commercial commodity owing to its intrinsic value as a raw material for the manufacture of activated carbon which has got wide industrial applications.

There are modern methods for commercial production of shell charcoal. The use of coconut shell instead of wood as fuel source would reduce the pressure on an increasingly scarce resource and in many cases avoid the import of costly fossil fuel. In addition the maximization of the use of coconut shell for charcoal production would also enhance foreign exchange earning through the export of charcoal or activated carbon prepared from it. The shell based activated carbon is considered to be superior to those obtained from other sources mainly because of small macropores-structure which renders it more effective for the adsorption of gas/vapour and for the removal of colour and odour of compounds.

As a result of intensive research during the past decade, an entirely new use of commercial exploitation has been found for coconut shell. This is the manufacture of coconut shell powder from shells. Early research work established its value in the plastic and allied industries and now it is extensively used as a compound filler for synthetic resin glues and as a filler and extender for phenolic moulding powders. This unique filler is also being used successfully in specialised surface finishes, liquid products (as an adsorbent), plastic adhesives, resin casting, mild abrasive products polyester type laminates, bituminous products and potent insecticides (as a diluent). Coconut shell flour gives a smooth and lustrous finish to moulded articles and also improves their resistance to moisture and heat. Coconut shell flour is preferred to many other similar materials like wood bark powder, peanut shell, etc. to use as phenolic extenders in various chemical industries because of its uniformity in quality and chemical composition. With the introduction of newer ideas, research and progressive stream lining, the scope for the coconut shell flour in plastics and other allied industries is expected to go up tremendously.

Coconut water from the tender young fruit is a delicious and nutritious beverage. Coconut water has a substantial amount of sugar, around 3% that makes it a suitable fermentation substrate, although the addition of more sugar is necessary for appreciable fermentation to take place. The bottled coconut water was found to have a shelf life of about 45 days. Consumer acceptability studies for the product showed a fairly good response from consumers. Although much research work had been carried out on bottling of coconut water, the commercial launching of this product has not taken place in India mainly due to problems like collection of large quantities of water, short time lag involved between collection and processing, delicate flavour and low keeping quality. However, coconut water could be commercially exploited for production of coconut vinegar. The Coconut Development Board in collaboration with Central Food Technological Research Institute, Mysore has developed a modern technique for producing quality vinegar from matured coconut water using vinegar generators. Other research work on coconut water utilization is currently being explored.

Coir pith, a waste from coir industry is being produced at 4.5 lakh tons annually and accumulated in the industrial yards causing environmental pollution, fire hazards and disposal problems. Studies are being carried out to find the feasibility of using the inoculated coir pith as manure in agricultural farms in place of farmyard manure and compost. The coir pith is now being used on a limited scale in the coconut garden as a mulch material due to its potential quality of high moisture retentivity. It has been observed that pith could be successfully utilized for the manufacture of many commercial products such as hard boards, insulators, expansion joint fillers, etc. The pith in combination with cement has been reported to be an excellent thermal insulating material. Its use in the preparation of moulds for the production of ash trays, electric fittings etc. has also been reported.

Problems and Constraints

The problems associated with the coconut processing sector are mainly related to transportation, storage, handling and preliminary processing of nuts. The bulky nature of coconuts causes transportation problems and thereby results in huge handling and transportation costs. In the absence of mechanical devices for preliminary operations like dehusking, deshelling and removal of testa, manual operations are to be resorted, leading to huge labour costs.

Developing new technologies alone will not solve the problem. Effective market promotion activities are to be organized in order to create consumer awareness and boost the demand of coconut products. The availability of coconut shell, a major by-product of coconut industry is again of scattered

nature without any organised market channels. Such problems could to a large extent be combated by resorting to integrated processing of coconut, so as to bring down the production costs and to make available the raw material near the factory. The high packaging costs is another constraint, which absorbs almost 50% of the actual cost of the product.

Future Strategy

Taking into consideration of the increased demand for fresh coconuts due to growing population and also the greater demand for convenience oriented products due to the increased pace of urbanization and changes in life-style, the country must opt for a strategy consisting of the following components:

- Promotion of integrated coconut processing units wherever high capacities are envisaged with technologies sufficiently flexible to vary the proportion in the product mix depending on the market response. Investment on such ventures would be in the order of Rs. 25-30 crores.
- Promotion of units in the small scale sector for the manufacture of products like coconut oil, desiccated coconut, coconut vinegar, Nata-de-coco, shell charcoal, shell based cups, shell powder, coconut milk based beverages etc. Investment on such ventures would be in the range of Rs. 5-15 lakhs.
- Research projects for opening new avenues in the field of coconut product diversification and by-product utilization should be undertaken so as to increase the overall market spectrum.
- Market promotional activities, should be undertaken for creating consumer awareness and boosting the demand of the products.
- There should be a closer interaction amongst the coconut processors, traders, research organizations and government by way of organising seminars, exhibitions, workshops and trade fairs for the overall growth of the coconuts processing industry.

2. Long Run Relationship of Coconut Markets in Kerala : A Co-integration Analysis

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Traditionally, price intergrations were tested by using zero order correlation or regression with absolute values. But the modern ecconomists ciritized this method by arguing that it was not an adequate measure to show the strength

of the relationship if the two variables were related in non linear manner. The co-integration method developed by Granger (1986) and Engle and Granger (1987) is used in this study to test the coconut market integration. The test result indicated that the farm prices of coconut in various markets of Kerala were integrated of order (1). After establishing the order of integration of each variable, pair wise co-integration regressions were carried out with the farm price of Trichur market as the independent variable and the respective farm prices in other markets as dependent variables. Secondary data on monthly farm price of coconut for 25 centres were utilised for the study. This test showed that all the coconut markets except Calicut market were integrated with Trichur market.

3. Development and Marketing of Cashew In India

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Cashew plays a pivotal role in the economy of India. It is grown mainly in the states of Kerala, Karnataka, Goa, Maharashtra, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal. In India, the area under cashew is 5.40 lakh ha producing 3.50 lakh MT of raw cashewnut. Of the total area under cashew, about 29% is in Kerala, 18% in Tamil Nadu and 14% in Karnataka. However, Kerala produces about 43% of the total production followed by A.P. (13%).

The exports of cashew kernels and Cashewnut Shell Liquid has a unique position in the international market. Among the plantation crops like coffee, tea, rubber and spices, cashew plays a prominent role in getting foreign exchange to the extent of 2% of the export earnings from this crop. For export of cashew kernels, the main market is United States of America. The foreign-exchange value of exports in 1993-94 was Rs. 1044 crores.

At present, there are 731 cashew processing units in India with a processing capacity of 6 lakh MT. Yet, the present production is only able to meet 50% of the processing capacity. In Kerala alone, there are 271 cashew processing units.

Research on cashew was started by the middle of this century, which was however more pronounced by the advent of AICCIP in 1972. By 1980, in addition to the different Agricultural Universities, a National Research Centre, exclusively for cashew, was started with its head quarters at Puttur. Today, as many as 25 high yielding cashew varieties are available in addition to an integrated and effective package of practices.

In India, about 18 lakh tonnes of cashew apple are available. Excepting Goa, none of the other States are utilising this valuable by-product on a commercial basis. In Goa, this is being utilised for the preparation of Feni by extracting the juice of the cashew apple. The Govt. of Goa is getting considerable income, say about Rs. one crore, byway of excise duty by this trade.

Apart from Feni, cashew apple can also be profitably utilised for the preparation of other edible products like jam, juice, syrup, chutney, candy, pickles etc.

Raw cashewnut is at present produced in many countries. India happens to be the major producer of raw cashewnut in the world. The world production of raw cashewnut is at present believed to be of the order of 669400 MT. The Indian production of 349390 MT obtained in 1993 collection season has come forth from 539724 ha of the area under cashew.

Cashewnut is mostly produced by small marginal farmers in India. Nearly 1-2 million farmers are involved in the production of raw cashewnut. Considering the processing ability available in India the Indian production meets only 50% of the demand. No scientific base has been built up with regard to the cost involvement in the production of raw cashewnut nor is there any scientific approach towards the pricing of raw cashewnut as well. The Indian raw cashewnut is at present being valued against the international price being obtained for the cashew kernels. Mostly the pricing is related with the value of kernels obtainable in the U.S. Market which at present continues to be the major market for Indian kernels.

With regard to the processing sector, the processing cost of raw cashewnut involves 76% of the value earned towards the cost of kernels obtained goes towards the cost of raw material (raw cashewnut) and the remaining 24% gets spread for various activities (labour, packaging, tax etc.) involved directly and indirectly towards obtaining the kernels for export.

4. Assessment of Losses due to Pests, Diseases and Drought in Black Pepper

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The already known technique of estimating crop loss has been slightly modified so as to include both stand loss and yield loss components for its estimation. The method has been applied successfully for estimating the loss in yield of black pepper due to incidence of pests, diseases and drought in

the Kannur district of Kerala during the three year period from 1989-1992. The results showed that average annual yield loss in black pepper due to the incidence of pests, diseases and drought was around 33 percent. Of these the direct loss due to death of affected vines accounted for 13 percent and the remaining 20 percent was the indirect loss due to the poor performance of the affected plants. The major contributors towards stand loss in pepper was quick wilt contributing to 9 percent loss followed by drought with 4 percent loss. Among all the casual factors contributing to yield loss in black pepper the most disastrous was the incidence of infestation by pollu beetle which accounted for about 13 percent loss. The annual average loss due to pollu disease was estimated to be around 5 percent. The avoidable loss in yield by adopting plant protection measures was estimated to be 43.13 percent.

5. Coffee Research Achievements and their Impact on Production/Productivity

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Coffee is one of the leading commodities in the international trade and is world's most important agricultural export product. The stimulating beverage crop is currently grown in over 80 countries. In India, coffee is mainly cultivated in the hilly tracts of Karnataka, Kerala and Tamilnadu the southern states forming the traditional areas and to small extent in non traditional areas such as Andhra Pradesh, Orissa, West Bengal, Maharashtra and North-eastern states. The two important commercial species are *Coffea arabica* (arabica coffee) and *C. canephora* (robusta coffee). *C. arabica* a high quality mild coffee is the most common species representing nearly 80% of the world production. As history indicates the coffee introduction in India dates back to 1670 AD when a muslim saint, Baba Budan is reported to have brought seven seeds from Yemen during the course of his pilgrimage and planted them in his hermitage, Dattatreya peeta on the hills near Chikmagalur, Karnataka.

A statutory organization called Coffee Board under the Ministry of commerce, Government of India was created during 1942, with the responsibilities of organising the marketing of coffee, promotion of consumption and providing the research and extension support to the industry.

Research Achievements

In coffee improvement strategy, prime importance has been given to evolve disease resistant varieties with high productivity, improved quality and better

adaptability. To accomplish this, a massive genebank comprising 405 arabica collections, 15 robusta types and 18 different species of Coffee collected all over the world, was established. An in-depth assessment of the individual collections of the genepool, genes conferring to rust resistance, plant ideotype, high yields, quality and drought hardiness have been exploited through breeding programmes and 12 elite arabica and three superior robusta selection/hybrids have been evolved for commercial cultivation.

Efforts of agronomy group through systematic experiments on spacing, manuring, foliar feeding, pruning, topping, irrigation and chemical weeding have resulted in a sound package of practices which helped in a great way for efficient coffee cultivation. Irrigation schedules have been developed and proved to be one of the best way to achieve a high and stable yield in robusta.

On the nutrition front, optimal fertiliser requirements have been standardised basing on crop removal for both arabica and robusta. Remedial measures for nutrient deficiency symptoms including micro elements have been devised.

Coffee Industry in India—Its Present Status

According to USDA, India's status in the World's coffee growing area in 1992-93 is 2.1 per cent and in the Asian's share it is 15.8 per cent. Among the coffee producing countries India occupies 14th place with respect to coffee growing area during 1993.

The world coffee production of 1993-94 crop has been placed at 97.1 million bags while the 1992-93 crop was 91.8 million bags. The average world production during the last six year period ending with 1993-94 was 97.45 million bags of 60 kilos. Total coffee production in India occupies for only 3.6% of the world production in 1993-94. Out of the total estimated production of coffee in India during 1992-93 season 43 per cent accounts for Arabica while the remaining 57 per cent accounts for Robusta. The productivity in India has been increased gradually from 228 kg/ha to 907 kg/ha in Arabica. In Robusta maximum productivity to the tune of 1065 kg/ha was touched during 1970s from the minimum level of 131 kg/ha during 1940s.

According to Ramaiah (1989), compound growth rates for the past four decades revealed that Robusta with 7.3% growth in production has shared sizeably the overall coffee production which found mainly due to the combined growth effects of area (4%) and productivity (about 4%). On the contrary the expansion of the Arabica area was little (1.25%) and the growth in production of Arabica (about 5%) had definitely been due to the increase in productivity.

The coffee trade has become lucrative now and growers are showing more devotion and interest in research and technological advancement in order to improve the production and productivity of their fields. Moreover, there is an increased emphasis for quality produce to rise up to the demand of buyer's preference and international market. Hence, under the changed market scenario, R & D has to play key role in coffee industry. This is the time for reorienting the coffee research giving more thrust to the programmes like pre and post harvest handling, upgradation of on farm processing techniques, residue monitoring for quality improvement, production of eco-friendly organic coffee and more efficient transfer of technology.

6. Spices Research Development — An Updated Overview

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Production of spices : pepper, cardamom, ginger, turmeric, chilli, coriander, garlic, cumin, celery, fennel, fenugreek, clove, cinnamon in India during 1992-93, was about 2.5 million tonnes.

Export of spices during 1993-94 showed an increase (38%) in quantity and value in dollar terms (31.3%). Export increased in value terms in pepper (129%), cardamom (85%), large cardamom (34%), turmeric (8%), cumin (14%), celery (24%), fenugreek (20%), other seed spices (34%), curry powder (27%) and spices oils and oleoresins (4%) over 1992-93 export figures. There was reduction in export of coriander, fennel and garlic. Increasing trend in the export of spice oils and oleoresins continued this year also. World trade in spices in 1993-94 was 4.5 lakh tonnes valued US \$ 1,500 million and India's share was 1.76 lakh tonnes (39%) valued US \$ 172 million (11.5%).

The 8th plan targets a growth rate of 10% in spices production compared to 4% in 7th plan. Investment on spices production under central sector scheme was only Rs. 5.74 crores during 1991-92 and it is now Rs. 125 crores during 1992-1997. There is all-round enthusiasm for spices production in the country.

So far, 9 high yielding varieties/hybrids in black pepper, 6 in small cardamom, 3 in ginger, 12 in turmeric, 13 in coriander, 5 in cumin, 4 each in fennel and fenugreek are released.

Salient achievements in biotechnology in spices include micropropagation and clonal multiplication in cardamom, black pepper ginger, turmeric, cinnamon and vanilla. *In vitro* selection for resistance to biotic and abiotic stresses especially rhizome rot in ginger is in progress.

India has a global monopoly in spices oils and oleoresins. During 1993-94, India exported 1270 tonnes of oils and oleoresins valued Rs. 69.21 crores against 1261 tonnes valued Rs. 66.63 crores during 1992-93. There are AGMARK specifications for various Indian spices and their value added products. The Bureau of Indian Standards has published a series of specifications to maintain and improve quality of Indian spices. High curcumin lines in turmeric, high piperine lines in black pepper, high essential oil lines in clove, cinnamon and nutmeg etc. are in the pipeline at National Research Centre for Spices, Calicut.

Environmentally friendly spices culture

Use of plant protection chemicals leads to residual toxicity in spices products. Moreover, there is high premium for organic spices. Biocontrol of pests and diseases is another area where useful information are generated. A fungus *Trichoderma sp. in combination with VAM suppresses Phytophthora capsici*, causitive organism of foot rot in black pepper. Biopesticides to manage pests of spices are also developed.

The targetted export during 1994-95 is 1.65 lakh tonnes valued Rs. 560 crores. Research and development activities are well tuned to achieve the above targets. The year 1993-94 also witnessed fall in export of coriander, fennel, fenugreek and garlic in quantity. Labour unrest at ports of exports in India is still continuing. Unreliable and unsustainable availability of spices for export continue to bother Indian exporters. The targetted production and export of spices during 1994-95 would be achieved subject to the stability in remunerative prices and the extent to which above negative trends are reversed.

7. Export Potential and Marketing of Spices

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India plays a predominant role in the spice trade with substantial production back up of wide range of spices. India produces around 2.5 million tonnes of spices annually and it is significant to note that the total world trade in spices is annually 1/5 of this. On an average, only 5% of production of spices from India is exported. However in the case of pepper and celery seed, major portion of the production is exported. Even with the 5% export India accounts for 1/3 of the spices trade which is roughly estimated at 4,50,000 tonnes by the International Trade Centre, UNCTAD, Geneva. Indian spices are exported to more than 100 countries all over the world. India is a larger supplier of a number of seed spices such as coriander, cumin, celery, fennel, fenugreek etc. Garlic, tamarind etc. are also produced and exported in substantial quantities.

Tremendous growth opportunities have made spices sector one of the most potential ones; the emerging health consciousness, rising consumer expectations, rigorous quality standards imposed by the buying countries, shift away from artificial flavourings and colour to natural ones, inclination for more leisure time, increasing popularity of ready to eat food products- all these factors have made this sector one of the most promising ones.

Technological strides have changed the conventional processing method. Computerised process control and quality assurance techniques have replaced the traditional methods.

Continuous research and development work has accelerated the phase of technological progress and development of new products such as Dehydrated green pepper, freeze-dried green pepper, frozen green pepper, pink pepper, sterilized pepper, ginger candy, etc.

Bulk packing of spices is giving way to a production of consumer packs through sophisticated processing and innovative packing, changing the complexion of spices sector. The consumers in developed markets are concerned about food safety. These concerns are expressed as strong consumer behaviour and Governments support these with regulations or legislations. The major concerns about contaminations are physical, microbial and chemical.

The quality starts with the farmer, the first person who handles the produce. Nature has given us clean and pure products. We should ensure that in the post harvest handling the products do not get contaminated. The Spices Board has set up a Quality Evaluation and Upgradation Laboratory which addresses quality issues on spices. This laboratory is used for analysing samples brought by exporters, traders and farmers and organising training and educational programmes for farmers, officials, scientists and exporters. We have so far trained about 50,000 farmers, all major exporters, a significant number of traders and have also created a set of master trainers numbering thousands. Quality upgradation is a continuous process from farmers to trader, trader to exporter and exporter to importer. Spices Board takes a lead role in spear-heading the message of quality. Today many processors have put up state of art machinery and modern laboratories to meet the international standards. Some of them have already got ISO 9000 series and few others are in the process of getting it. The Spices Board have developed a new concept already, the Logo as a symbol of quality and Indianess for consumer pack spices. The Logo is total quality mark. It is awarded only to those selected exporters/processors who establish and maintain high standards in production, processing, storage, quality evaluation as per the rigorous standards stipulated by the Spices Board. Not only the product but the process behind it should match the rigorous standards

of quality to qualify for the Logo for exporters brand. The Spices House Certificate is the latest step in the series of quality programmes launched by the Spices Board. Spice House Certificate recognises such exporters who have made investment in establishing facilities to assure consistent quality for their products. The Spice House Certificates are awarded to those who have established facilities for cleaning, processing, grading, packaging, warehousing and quality assurance.

As the largest producer of spices, India has the capabilities but the million dollar question is how to go ahead? How to match the exacting international standards that are emerging in all the buying countries abroad? It requires concerted efforts at every level in which growers, exporters and Government agencies, in harmony strive hard to make the produce attain the international quality standards; we can successfully enter and achieve sustainable growth in the global market only if customer's quality expectations are satisfied.

The consumer of today, in short, required food which is convenient, quick to prepare, readily available, consistent in quality and as close to natural as possible, and environmentally friendly. The winner is one who can measure upto these standards.

Let us harness our energy to make our spices match these standards and the amazing world market is ours. Yes, we have Resources, Potential and Capabilities- what is needed is PERFORMANCE.

8. Rubber Plantation Industry in India in the Context of the New Economic Scenario

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Natural rubber (NR) is one among the ten core commodities covered by the Intergrated Programme for Commodities (IPC) under the auspices of UNCTAD for assistance. The case of rubber is a classic example illustrating the vulnerability of the developing countries to price fluctuations in the world market. The free market price indices of NR declined to the extent of 40 percentage points in 1990 from its 1980 level (UNCTAD, 1990). However, compared to the other three plantation crops viz. coffee, tea and cocoa covered by the IPC among ten core commodities NR displayed better resilience inspite of volatile marked conditions in the 1980's.

Till 1991 Malaysia was the leading producer and exporter of NR and in 1990 the share of NR in its total export earnings declined to 3.8 percent from 55 percent in 1960. Major changes in the NR production sector consisted of

switching over to relatively more profitable and less labour intensive crops like oil palm, introduction of labour saving mechanisms at different stages of NR production and intercropping during the immature phase. In the processing sector, emphasis is on the development, production and exports of value added forms of rubber and commercialisation of processing wastes. Geographically, NR production shows a very high degree of concentration and sector wise concentration is characterised by the dominance of rubber small holdings.

Of the total NR production of 5500 thousand tonnes in 1993, the relative share was 28.5% by Thailand, 23.7% by Indonesia, 19.5% by Malaysia, 21.8% by other Asia and only 6.5% by other countries.

The structure of world rubber consumption is characterised by the dominance of synthetic rubber (SR) and in 1992 the relative share of SR was 62.3%. Since 1960's SR has systematically replaced NR in the world rubber market and the relative share of SR reached its peak level in 1974 (70.6%). Although its share has declined to 62.3 percent in 1992 the SR manufacturing industry occupies a pivotal position in the world rubber market in terms of its unique advantage of both backward and forward integration with petrochemical and automotive tyre manufacturing industries respectively.

The pattern of world rubber consumption and NR consumption is dominated by the tyre and tyre products manufacturing sector. Another important dimension of the consumption sector is the geographical concentration in the consumption of rubber.

According to 1991 estimate, the major rubber consumption was in ten regions/countries USA, EEC, CIS & Japan.

An important development having positive implications on the NR production sector is the steady increases in the consumption of NR in the major producing countries, especially, China, India and Malaysia. The rise in the consumption is mainly propelled by the boom in the manufacturing of latex based products since mid 1980's and the inherent locational advantages for the NR producing countries. The dominance of the major NR importing countries in the total rubber consumption is structurally rooted with the pivotal position in the control on the production of automotive tyre and allied products. However, in the context of growing integration of world rubber economy, the comparative advantages associated with the raw material and labour costs in the production of rubber products will have an important bearing on the prospects of NR producers.

Natural Rubber Economy of India

India is the fourth largest producer of NR and its productivity is reported to be the highest of NR in the world. In 1993-94 its total production was 4,35,160 tonnes. During the year the total area under cultivation has increased to 5,10,000 ha. An important characteristic of NR cultivation in India is a very high degree of geographical concentration. About 86% of the total area under rubber in in Kerala.

One of the main features of NR cultivation in India is the dominance of smallholdings sector as its share in area under cultivation and production is about 85 percent. Compared to the three major NR producing countries, viz., Thailand, Indonesia and Malaysia, India is having the unique advantage of captive market arising from a well developed rubber goods manufacturing sector. India has been a net importer of NR since 1948 and at present India is ranked eighth among the major rubber products manufacturing countries.

An important feature of rubber consumption in India is a relatively higher share of dry rubber products manufacturing sector accounting for about 86 percent in 1991-92. The share of automotive tyres and tyre products share alone is about 49%. More than 90 percent of India's export earnings consists of dry rubber products and the relative share of automotive tyres and allied products is 71.68 percent. India had been enjoying a favorable balance of trade in the foreign trade of rubber products since 1971-72 to 1992-93 without any significant change in the structure of exports.

A potential area for exploitation in the production sector is the commercialisation of the by-products. In India, commercialisation of by-products such as rubber wood, rubber seed and rubber honey is not upto the desired extent. In the rubber goods manufacturing sector the need for a specific export policy is highlighted (Mohankumar, 1994) to exploit the locational advantage in the production of latex based products and by restructuring the destination of exports.

9. Market and Prices of Indian Cardamom — An Economic Analysis

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Cardamom is an important plantation crop of India. In the history of cardamom industry in India a traditional marketing system has been in vogue through auction sales. Cardamom is marketed through the auction centres

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located at three cardamom producing states, Kerala, Karnataka and Tamilnadu. Vandanmedu in Kerala, Sakleshpur in Karnataka, and Pattivecranpatti and Bodinayakanur in Tamilnadu have emerged as the major auction centres in the above states.

The present investigation is based on the monthly data on auction arrivals and prices for over 19 years. The market structure of cardamom could be said to be an organised market. In Karnataka cardamom was under the regulation act till the beginning of the 1970's in order to protect the interest of the farmer-producer at minimum cost to the state. The channels of cardamom marketing is characterised by a small number of exporters/dealers, a large number of dealers, and a few auctioneers- a market environment which approximates an oligopoly.

The present study has analysed the export performance through the market share model in terms of a changing direction of trade effect, individual market share effect, overall market share effect. The study has also examined the product market changes in the world, changing Indian share in the cardamom trade and export demand elasticity has been worked out after completing an appraisal of the Indian cardamom export performance.