

Policies, Programmes and Experience in India : Improving Productivity of Coconut Gardens through Replanting and Rejuvenation*

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1. Introduction

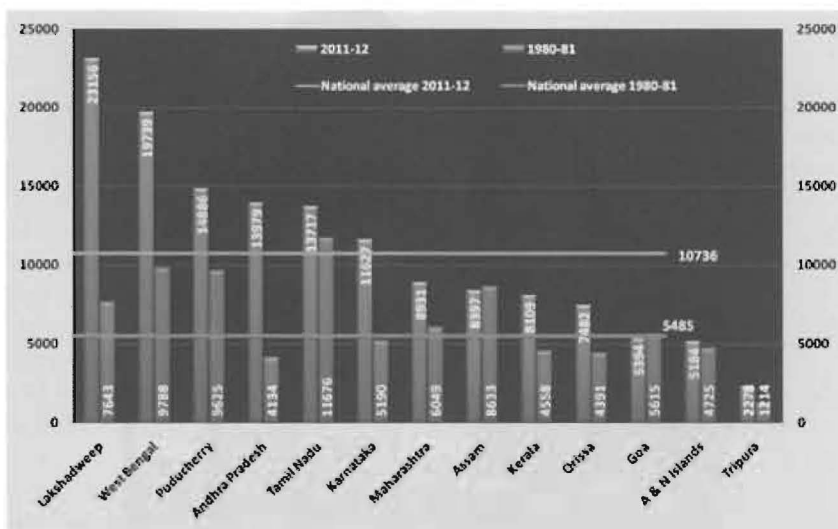
The current Indian coconut scenario presents an encouraging picture, with India on top in coconut production and productivity among the coconut growing countries of the world. Coconut production in India has crossed the level of 21 billion nuts, surpassing the production level of major global players in the field, like Indonesia and Philippines. In India, bulk of coconut production comes from the Western plains and the Ghat region comprising of the states of Kerala, Karnataka and Maharashtra followed by the Eastern Coast plains and hill regions comprising of Andhra Pradesh, Orissa, Tamil Nadu and Puducherry. The islands of Andaman & Nicobar and Lakshadweep and the coastal tracts of Gujarat are the other traditional coconut growing areas. Certain regions of Karnataka and Tamil Nadu and the states viz. Assam, Tripura, West Bengal and the Northern Bihar are the other non traditional areas where coconut cultivation has made inroads rapidly in recent years.

In 1990s out of the total production of the country, Kerala, Karnataka, Tamil Nadu and Andhra Pradesh, the 4 major southern states, together accounted for 96 percent of production of which Kerala's contribution was 62 percent. Thus the production and productivity of coconut in Kerala had a greater bearing on the all India production

level. Coconut is the main stay of the people in the state with the entire fabric of the rural economy closely woven around the coconut palm. The productivity of Kerala is 7814 nuts per ha which is less than the national average of 11,419 nuts per ha. Kerala's productivity is less than 50% of the productivity of neighboring state of Tamil Nadu which is 16,000 nuts per ha. Prevalence of old and senile palms, poor genetic base of the planting material under cultivation, over populated stand of both coconut and other trees in the homestead, poor management care given to the crop and severe incidence of pest and diseases are the major reasons for the low productivity. One of the strategies

to vitalize the coconut industry is to improve the general agricultural base with large scale rejuvenation of coconut gardens. Measures like removal of old, senile and unproductive palms, gap filling, restructuring home gardens by adopting shade regulations, removal of unwanted trees, in filling with selected economic species, soil and water conservation and water harvesting, irrigation, cultivation of compatible intercrops with integration of animals and fish, adoption of zero tillage technology and strengthening of organic based with legumes and bio agents need to be integrated in coconut gardens as the rejuvenation strategy.

Inter-state variations in Productivity of Coconut in India



*Paper presented in XLVI Cocotech Conference at Colombo : 7 – 11 July 2014

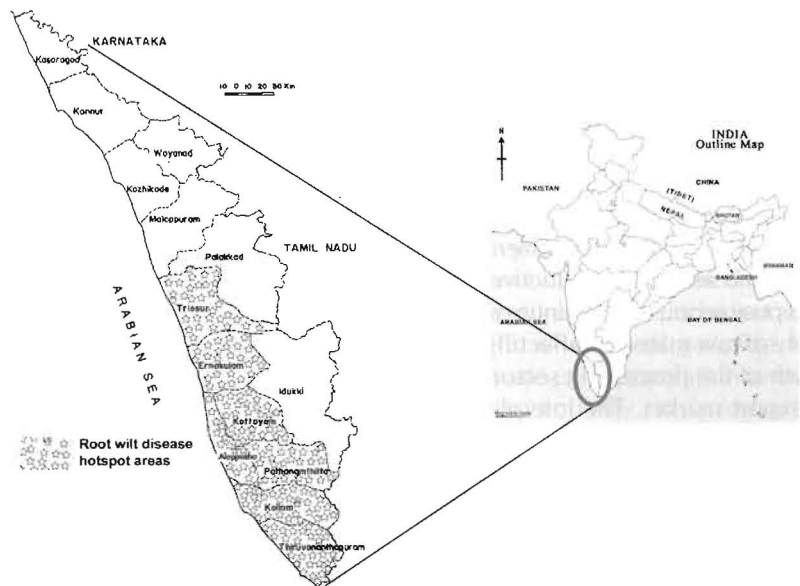
Now the state's contribution has touched a very low percentage of 26.6 even though the total output of coconut in the country is on the increase. This is due to the fact that the increase in production achieved by the states of Tamil Nadu, Karnataka and Andhra Pradesh during this period has been significantly high (Fig 1). This situation is a clear indication that the monopoly of Kerala in the country's production is losing and the state of Tamil Nadu will soon overtake Kerala.

The dwindling production and productivity in the state of Kerala was attributed to many reasons. The most important among them are prevalence of root wilt disease and large population of old, senile and unproductive palms. Unscientific management practices adopted by farmers, lack of irrigation facilities and rain fed nature of cultivation, small size of coconut holdings, etc are the other attributed reasons. Small size of coconut holdings discourages the farmers to bestow adequate attention to the crop as a major source of livelihood and employment.

2. Root Wilt and low productivity

Root wilt is a debilitating disease which was reported in 1882 and the disease has spread to the entire southern districts of Kerala at various intensities (Fig. 2). Monetary loss estimated due to root wilt in 1948 was 5.6 million nuts which was grown up to 968 million nuts in 1984. In 1996 the disease had spread to 50 % of the area under coconut in Kerala. The disease, even after 132 years of intensive research, is evading a perfect control measure. The disease is debilitating and not causing instant death of the palm, but results in gradual decline in productivity. The recommendation of the research to farming community is to sustain the productivity of the palm through better management practices including irrigation. Juvenile palms

Fig 2. Map of Kerala showing Root wilt hot spot areas



and highly disease advanced palms, however, cannot be improved through management practices. These palms, if not removed serve as source of inoculum. Therefore the strategy is to cut and remove the disease advanced, old and senile palms which yield less than 10 nuts per year.

The 1996 survey also revealed that there were 80 lakh disease advanced palms in the stage of removal in Kerala. Despite the implementation of specific programmes for cutting and removal of root wilt disease advanced palms, a massive effort to remove all the affected palms was not initiated till 2006. Root wilt disease caused by phytoplasma has no definite control measures. The bearing palms which are in the initial to middle stages of disease intensity, respond well to the management practices whereas disease advanced palms never respond to any kind of management practices. This observation necessitates the removal of all palms in the advanced stages of diseases. Multiple cropping and mixed farming systems in root wilt affected gardens have an ameliorating effect on the disease affected palms.

Keeping in view the above scientific background that productivity of root wilt disease affected palms can be sustained through better management practices after cutting and removal of disease advanced palms, programmes were formulated by CDB as early in the beginning of 1980's for cutting and removal of root wilt affected palms by giving compensation. The concept of productivity improvement through integrated farming practice was mooted early in the latter half of 1980s and Coconut Development Board chalked out a programme for "Integrated farming in coconut holdings in Kerala for productivity improvement. This programme is still continuing parallel to the Replanting and Rejuvenation Programme put in operation in 2009-10 which is explained below:

3. Replanting and Rejuvenation programme - Genesis

(a) PNG Declaration

The 43rd Annual session of APCC held in Papua New Guinea on 7-10 November, 2006 made a declaration

to accelerate the Replanting Programme in coconut member countries. The situation that led to effect the declaration was the degeneration of coconut sector owing to the consistently declining coconut productivity in most of the member countries. The Session also recognized that more than 30 percent of the coconut in the member countries is senile, unproductive and could pose serious uncertainties in the supply of raw materials affecting the growth of the processing sector and the export market. The interplay of these factors of low productivity and income has adversely affected the livelihood of millions of people who constitute the under privileged sector of the coconut community, the declaration read.

Pursuant to the declaration, APCC gave due emphasis to:

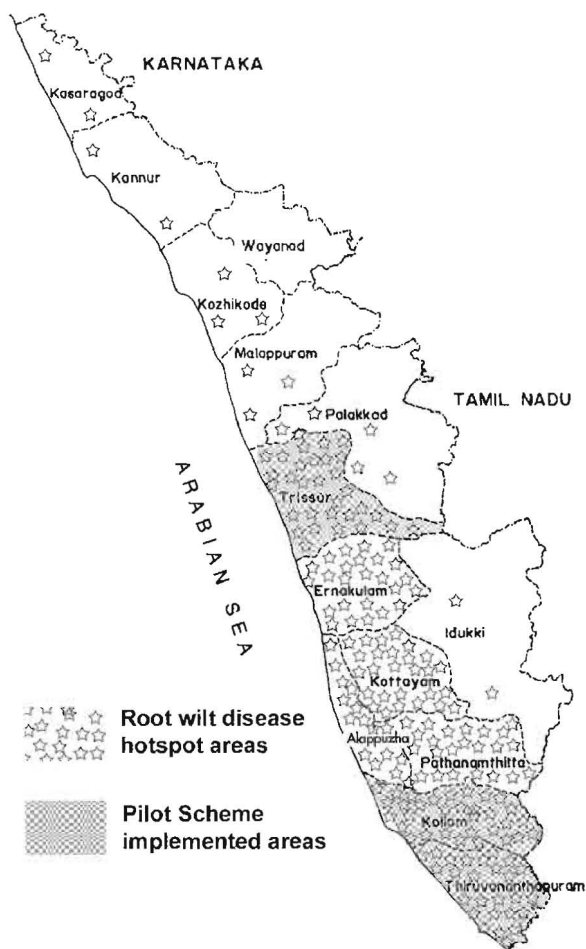
- Promote the rapid establishment of coconut nurseries in strategic areas using selected local varieties and hybrids;
- Exert best efforts to generate funds/ investments from both the government and the private sectors for coconut planting and replanting;
- Promote the establishment of new coconut farms/ plantations;
- Accelerate the replanting of existing senile palms.

The member countries including India made commitment on the occasion to initiate programme of action in cognizance with government policies to implement the declaration within the next 5 years.

(b) Indian Experience

In India, there had been no systematic replanting and rejuvenation in coconut unlike other plantation crops like tea, coffee or rubber. At the same time, formulation of a Replanting and Rejuvenation (R&R) project was mooted

Fig 3 Map of Kerala showing Pilot R&R project areas



immediately, when the policy makers focused the issue of declining coconut productivity in the country and more particularly in the state of Kerala. During this period Government of India declared a massive rejuvenation programme for other plantation crops like tea, coffee and rubber. In this background and in pursuance to the PNG declaration, the Government of India announced a Replanting and Rejuvenation programme for coconut. The project was however officially declared in 2009-10 on Pilot scale for covering an area of 0.135 million ha and started implementation in 3 selected districts of Kerala, the most premier

traditional state in India and in one island where the intensity of senile and unproductive palms is more. The districts in Kerala were Trivandrum, Kollam and Thrissur (Fig. 3) and the Island was Andaman & Nicobar. The total cost of the project was Rs. 22,750 million (\$ 380 million) with Government of India subsidy of Rs. 4,785 million (\$ 80 million).

The main objective envisaged under the scheme was to enhance the production and productivity of coconut by the total removal of all old, senile, disease advanced and unproductive palms and the rejuvenation of the remaining palms in a mission mode with the

following components:

- *Cutting and removal of all old, senile, unproductive and disease advanced palms followed by replanting.*
- *Rejuvenation of existing gardens through integrated management practices.*
- *Assistance for replanting.*
- *Implementation, Monitoring, Evaluation, Training etc.*

A subsidy @ Rs. 13,000 (\$ 217) per hectare was extended to the farmers for cutting and removal of old, senile, disease advanced and unproductive palms. The cutting and removal of the palms is followed by subsidized subsidy of seedlings @ Rs. 640 (\$ 11) per ha. The garden is rejuvenated through proper management practices for which a subsidy of Rs. 15,000 (\$ 250) per hectare is provided in two annual installments. The implementation of the scheme is physically monitored at national, state level, district level and Village Council level Committees of officials from Research and Development organizations of Central and State Governments and peoples' representatives.

4. Procedural formalities in implementation:-

- (i) The programme was implemented in a farmer participatory mode in contiguous areas for visible impact. Each ward in Village Council was considered as a Cluster where farmers have formed themselves into a group. Each Cluster had an elected Cluster Convener and sub group leaders.
- (ii) A base-line survey is carried out in a farmer participatory mode covering all holdings in the project area. The palms for cutting and removal are identified by the farmers themselves and verified by the

Cluster Convener and are inspected by the Agriculture officer of the State Government/ the Board's officials.

- (iii) Based on the information in the base line survey, projects are formulated for different areas. The project report is recommended by the State Level Monitoring Committee to Chairman, Coconut Development Board who, in turn accord administrative approval for implementation.
- (iv) This is followed by cutting and removal of the entire identified/ marked palms, rejuvenation of gardens by application of inputs and plant protection measures and replanting.

Implementation of the project was entirely through online soft ware developed solely for the purpose. Baseline data entry, project preparation, subsidy claim submission, release of payments, monitoring – all these were software based. This system made the scheme implementation faster, and smoother.

Research Institutions like CPCRI has played a significant role in disease identification, seedling production programme and in the successful implementation of the programme.

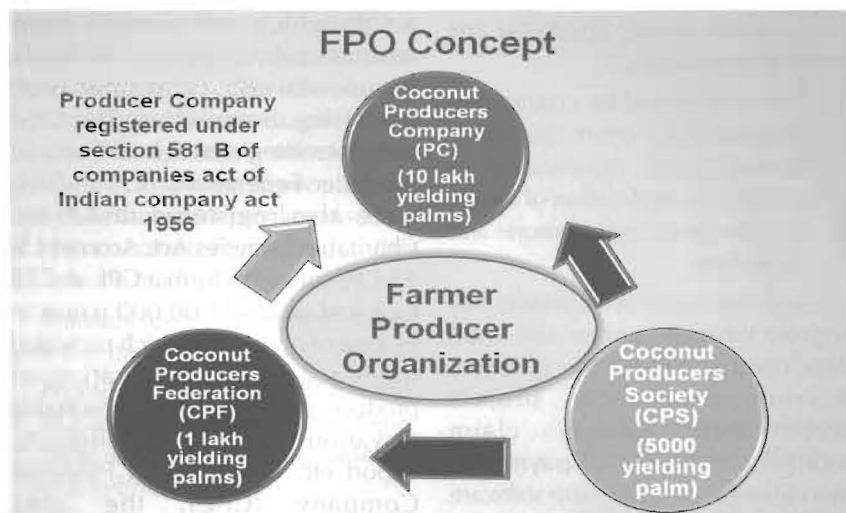
5. Implementation through Farmer Producers Organizations (FPOs)

Implementation of R&R scheme through Farmer Producer Organizations (FPOs) was a breakthrough in the farmer participatory movement which gained momentum in the country. Board had of late initiated a process of forming Farmer Producer Organizations (FPOs) in the coconut sector. The objective was to bring the small and marginal coconut farmers together so as to undertake production, processing, value addition and

marketing of coconut in a remunerative manner. This will help the farmers realize a fair, assured remunerative price for their produce. The collectivization started with Coconut Producer Societies (CPS). Grass root level farmer collectives comprising of 40-100 coconut farmers were grouped to form a CPS which was registered as a Charitable Society. A minimum of 5000 coconut palms was ensured in the catchment area of a CPS which will provide them adequate palm population to initiate group activity in production, processing or marketing. The CPSs were then integrated to form Coconut Producer Federations (CPF) which were also registered under the Charitable Societies Act. Around 15-25 CPS joined to form a CPF. A CPF thus had around 1,00,000 palms in its area of operation which provided them scope for aggregation of produce, group marketing, processing to various value added products, export etc. The Coconut Producer Company (CPC), the apex organization was then formed integrating 10 CPFs. A CPC will ideally have around 10 lakh palms in its area of operation. CPC can undertake further processing, packing, branding and marketing of the coconut products. CPCs are registered under section 581B of the Indian Companies Act 1956 with the Registrar of Companies. CDB had embarked on formation of CPS in 2011-12 which were then stabilized and federated to form CPFs in 2012-13. The formation of CPC was initiated in 2013-14, thereby providing a stable foundation for each tier so as to ensure sustainability. As on 20.6.2014, a total of 5165 are registered with CDB. A total of 472 CPFs have been formed and 17 Coconut Producer Companies have been registered in the country (Table 1).

Table 1 Progress of Coconut Producers' Society, Federation and Company formation as on 20-June-2014

State	CPS registered with CDB	CPF registered with CDB	CPC registered
Kerala	4229	204	12
Tamil Nadu	255	47	0
Karnataka	325	203	4
Andhra Pradesh	356	18	1
Total	5165	472	17



6. Outcome of the Project

The pilot project was concluded in 2013-14. The project was extended to the remaining 11 districts in Kerala, based on the success of the Pilot Scheme. Under the Pilot Scheme, 1.77 million palms were removed, 0.76 million seedlings replanted and 0.148 Million ha rejuvenated. Agricultural inputs were supplied to all palms in these areas. Total subsidy utilized for the purpose was Rs. 1614.3 million (\$ 30 M),

The project was scaled up in 2013-14 and implemented on a wider scale through Farmer Producer Organizations and within one year the programme was covered in 73000 ha. Under the extended programme 0.548 million palms were removed, 0.15 million seedlings replanted and 73000 ha rejuvenated. Chemical and organic inputs were supplied to 6.79 million palms.

Thus within the span of five years 2.32 million coconut trees were removed from 0.22 million ha and replanted 0.9 million seedlings were replanted. The Board had spent Rs. 2360.0 million (\$ 39.5 million) towards incentive to farmers. From 2014-15 a slight increase in subsidy was also brought in, in order to heavily compensate the loss of cutting of palms and to safe guard the existing palms. The revised compensation is Rs. 32,000 (\$ 533) for cutting and removal, Rs. 37,500 (\$ 292) for rejuvenation and Rs. 4,000 (\$ 67) for replanting. This programme secured the identity of a scheme with the highest investment for a single crop India had ever witnessed.

PNG Declaration also listed rapid establishment of coconut nurseries using local varieties and hybrids and establishment of coconut farms/

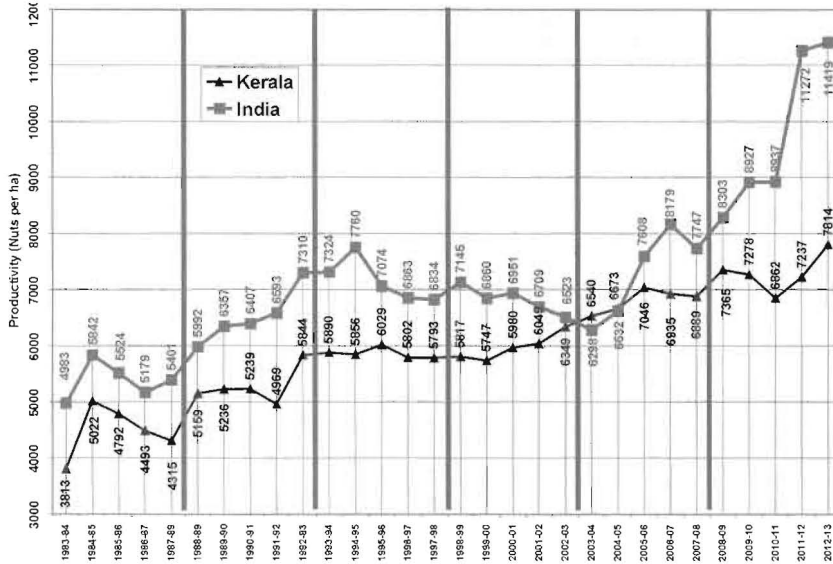
plantations. India attempted these areas as well. During the last one decade, Coconut Development Board assisted 165 Coconut Nurseries and 60 Seed Gardens in private sectors which put together is capable of producing more than 10 lakh seedlings per annum. Coconut farms have been established under the aegis of Coconut Development Board in 320 ha and establishment of plantations is encouraged in private sector by providing new planting incentives.

7. Impact of Rejuvenation Project

In order to assess the impact of the scheme a midterm evaluation was done through a reputed agency. Replication of the project in other districts of Kerala and other major coconut growing states was recommended in the report. Significant improvement in production and productivity was predicted after two-three years.

As mentioned before the strategy of cutting and removal and adopting productivity-improvement measures were followed from early 1990s under various programmes of the Board and hence there was slight reduction in root wilt disease intensity in the mid 1990s than that of 1980s. This was not adequate enough to save the coconut palms of Kerala and the experts from various corners felt that complete removal and replanting should be the future strategy and hence the Rejuvenation programme was emanated. The productivity trend given in Figure 4 explicit the erratic movement of Kerala's productivity but it is seen that the movement is more or less in line with country's movement. It is very glaring that the productivity which was in a declining trend got freed from the diminishing trend and attained upward trend from 2010-11 and is still continuing. This is clearly attributed to the impact of the Rejuvenation programme which was focused on disease eradication and productivity improvement.

Fig 4. Trend in Productivity of Coconut in India v/s Kerala



It is observed that disease spread has arrested to a significant level. An analysis of the disease situation however, is yet to take up through a systematic survey, since a period of completed five years would be considered feasible for such an analysis. But the disease spread and intensity has come down from field observation and farmer feed back. Other significant impacts are:-

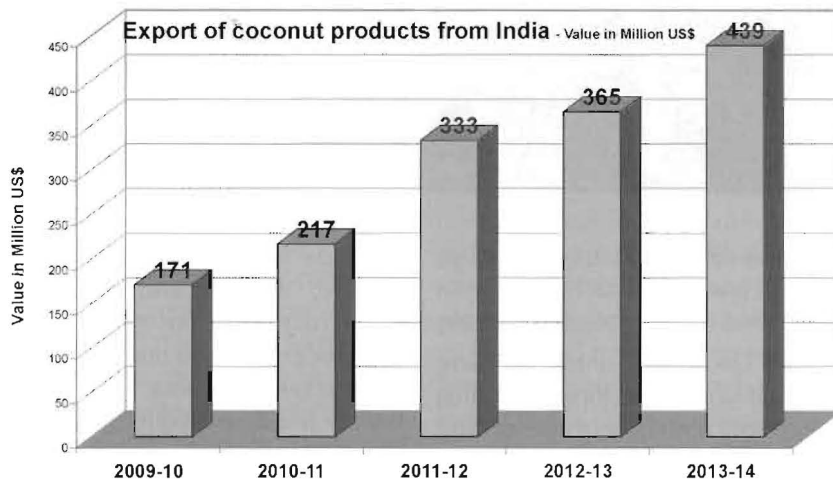
- The general health of palms in all the project areas has improved and showing signs of revival vigor

due to the application of recommended dose of inputs.

With the increase in production and productivity, processing and export also has taken a linear growth during the last 5 years. The percentage of production in India which was consumed in processing sector was less than 10% where as the same has grown up to 20% in 2013-14.

The percentage increase recorded in export is 156.7 since the introduction of the Rejuvenation

Fig 5. Export of coconut products from India



Programme. It has grown from \$ 171 Million to \$ 439 during 2009-10 to 2013-14 (Fig 5).

Implementation of scheme is through Farmer Collectives which has resulted in aggregation of coconut farmers who were otherwise widely unorganized.

India has thus kept its commitment of adopting Rejuvenation Programme in accordance with PNG Declaration. In the context that productivity of coconut in other major coconut growing countries is not very encouraging, suitable strategies could be adopted by these major players for productivity improvement. In Indonesia and Philippines, per ha productivity is centered around 4000 nuts for the last 15 years while in Sri Lanka it recorded comparatively higher level and crossed 6000 nuts in the last 5 years. The average of these countries for the last 15 years is 4100, 3976 and 6491 nuts per ha respectively.

8. Conclusion

Policies and programs put in place by India in pursuant to the declaration taken in the 43rd APCC Session in PNG for improving productivity of coconut have yielded results. Replanting & Rejuvenation Programme implemented in last 5 years in Kerala has helped to reverse the declining productivity trend and to arrest the root wilt disease spread and intensity of disease. In the context that productivity of other major coconut growing countries is also not very encouraging these countries can also evolve suitable strategies for productivity improvement. India which is presently number one in production and productivity is all set for a quantum jump in processing and export also. Policies and programmes of India are targeted to achieve this goal within the shortest period.