

# PATTERN OF PRODUCTION AND PRODUCTIVITY OF COCONUT IN KERALA

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## ABSTRACT

The pattern of production and productivity of coconut in Kerala over the years 1957-58 to 1974-75 has been critically analysed with special reference to the problem of decline in its productivity. The possible reasons for the productivity decline are identified and suggestions on the course of action to arrest it are made.

## INTRODUCTION

Among the coconut growing States in India, Kerala ranks first, accounting for about 62% of the total nut production. During 1974-75, the area under coconut in Kerala was 7.48 lakh ha, *ie.*, over one-third of the net cropped area in the state. The share of the crop in the total agricultural income of the state (excluding tea, coffee and rubber) during 1970-71 was of the order of 34.6% (Majumdar, 1972). It is mainly a small holder's crop with about 90% of the holdings being less than one ha in extent and the average size of the holding being 0.22 ha. The coconut culture and industry also provide full time or part time employment to over 10 million people in the country (Thampan, 1970). It is also a foreign exchange earner. Through the export of coir and coir products, the country has earned foreign exchange worth Rs 227.7 million during 1976-77 (Anon., 1977a) and over the years the value of exports have been rising. Because of all these, the coconut crop occupies a place of unique importance in the economy of Kerala. In this context, a study on the trends in production and productivity of coconut in the state assumes importance.

## MATERIAL AND METHODS

The data relating to area, production and productivity of coconut, for the country as a whole, as well as for Kerala State, for the period 1957-58 to 1974-75, presented in Tables I a, b, and c, were taken from the various reports of the Directorate of Economics

and Statistics (Ministry of Agriculture, Government of India, New Delhi). Similar data for Trivandrum, Quilon, Alleppey and Cannanore districts in Kerala State were obtained from the reports of the Bureau of Economics and Statistics, (Government of Kerala, Trivandrum). Continuous comparable data for the remaining seven districts in the state were not available for the full span of the reference period, because they were either formed after 1957-58 or some changes have taken place in their geographical boundary, as a result of the formation of new districts. The procedure followed by the Bureau of Economics and Statistics, for computing the area and

**Table 1a.** *Area under coconut in India, Kerala and selected districts in Kerala 1957-58 to 1974-75*

| Year    | Area in thousand ha |        |            |        |          |           |
|---------|---------------------|--------|------------|--------|----------|-----------|
|         | India               | Kerala | Trivandrum | Quilon | Alleppey | Cannanore |
| 1957-58 | 666                 | 463.3  | 55.93      | 56.22  | 68.24    | 45.52     |
| 1958-59 | 690                 | 475.7  | 56.54      | 56.76  | 68.46    | 48.16     |
| 1959-60 | 715                 | 492.5  | 56.35      | 60.36  | 74.23    | 48.35     |
| 1960-61 | 717                 | 500.8  | 55.04      | 64.71  | 75.83    | 48.41     |
| 1961-62 | 723                 | 504.8  | 55.33      | 64.87  | 77.06    | 48.47     |
| 1962-63 | 798                 | 539.3  | 55.82      | 70.26  | 68.43    | 66.74     |
| 1963-64 | 798                 | 545.0  | 56.86      | 70.43  | 69.06    | 67.24     |
| 1964-65 | 848                 | 559.0  | 58.71      | 73.46  | 70.78    | 69.94     |
| 1965-66 | 884                 | 586.3  | 61.15      | 74.02  | 75.60    | 73.72     |
| 1966-67 | 893                 | 609.6  | 61.76      | 77.72  | 77.60    | 76.07     |
| 1967-68 | 924                 | 638.7  | 70.40      | 80.05  | 79.68    | 78.57     |
| 1968-69 | 988                 | 686.1  | 73.89      | 85.00  | 81.56    | 90.39     |
| 1969-70 | 1033                | 707.8  | 76.14      | 91.73  | 82.46    | 93.93     |
| 1970-71 | 1046                | 719.1  | 76.52      | 92.51  | 81.96    | 93.24     |
| 1971-72 | 1078                | 730.3  | 77.33      | 104.27 | 82.14    | 88.58     |
| 1972-73 | 1099                | 745.4  | 76.19      | 106.80 | 79.94    | 91.22     |
| 1973-74 | 1102                | 744.8  | 76.96      | 106.80 | 79.94    | 91.22     |
| 1974-75 | 1116                | 748.1  | 77.27      | 107.41 | 79.97    | 92.28     |

**Table 1b.** *Production of coconut (million nuts) in India, Kerala and selected districts in Kerala*

| Year    | India | Kerala | Trivandrum | Quilon | Alleppey | Cannanore |
|---------|-------|--------|------------|--------|----------|-----------|
| 1957-58 | 4455  | 3199   | 370        | 424    | 503      | 315       |
| 1958-59 | 4589  | 3248   | 374        | 390    | 504      | 333       |
| 1959-60 | 4734  | 3365   | 385        | 412    | 508      | 330       |
| 1960-61 | 4639  | 3220   | 354        | 416    | 488      | 311       |
| 1961-62 | 4478  | 3247   | 356        | 417    | 496      | 311       |
| 1962-63 | 5017  | 3305   | 342        | 431    | 419      | 409       |
| 1963-64 | 4725  | 3262   | 340        | 422    | 413      | 403       |
| 1964-65 | 5043  | 3273   | 324        | 436    | 514      | 287       |
| 1965-66 | 5035  | 3293   | 376        | 418    | 505      | 282       |
| 1966-67 | 5192  | 3425   | 380        | 438    | 518      | 291       |
| 1967-68 | 5321  | 3593   | 483        | 451    | 532      | 301       |
| 1968-69 | 5546  | 3834   | 454        | 479    | 545      | 346       |
| 1969-70 | 5859  | 3956   | 468        | 517    | 551      | 363       |
| 1970-71 | 6075  | 3981   | 470        | 522    | 547      | 357       |
| 1971-72 | 6088  | 4054   | 475        | 588    | 459      | 338       |
| 1972-73 | 5997  | 3921   | 440        | 607    | 510      | 335       |
| 1973-74 | 5851  | 3703   | 445        | 528    | 443      | 312       |
| 1974-75 | 5961  | 3719   | 446        | 531    | 444      | 315       |

production statistics was as follows: the total number of palms is first estimated, on the basis of land utilisation survey reports and the area under the crop is computed by dividing the total number of palms by the average stand per ha, obtained from pure coconut plots. To arrive at the total production figure, the estimated total area is multiplied by the average yield, which again is based on field crop cutting surveys and the seasonal condition factor, based on field forecast reports. The production estimates for the period 1965-66 to 1974-75 have as their base, the estimates of the sample surveys which ended in 1966.

**Table 1c.** *Productivity of coconut palms in India, Kerala and selected districts in Kerala*

| Year    | Productivity of palms (nuts/ha) |        |            |        |          |           |
|---------|---------------------------------|--------|------------|--------|----------|-----------|
|         | India                           | Kerala | Trivandrum | Quilon | Alleppey | Cannanore |
| 1957-58 | 6689                            | 6832   | 6616       | 7542   | 7371     | 6920      |
| 1958-59 | 6651                            | 6832   | 6615       | 6923   | 7362     | 6914      |
| 1959-60 | 6621                            | 6430   | 6615       | 6826   | 6844     | 6825      |
| 1960-61 | 6470                            | 6430   | 6432       | 6428   | 6436     | 6424      |
| 1961-62 | 6194                            | 6130   | 6435       | 6429   | 6436     | 6416      |
| 1962-63 | 6288                            | 5985   | 6127       | 6134   | 6123     | 6128      |
| 1963-64 | 5920                            | 5864   | 5979       | 5992   | 5980     | 5994      |
| 1964-65 | 5950                            | 5864   | 5519       | 5936   | 7262     | 4103      |
| 1965-66 | 5775                            | 5617   | 6149       | 5647   | 6680     | 3825      |
| 1966-67 | 5814                            | 5618   | 6153       | 5636   | 6676     | 3826      |
| 1967-68 | 5760                            | 5625   | 6150       | 5634   | 6677     | 3831      |
| 1968-69 | 5613                            | 5590   | 6145       | 5635   | 6682     | 3828      |
| 1969-70 | 5670                            | 5589   | 6147       | 5636   | 6681     | 3824      |
| 1970-71 | 5811                            | 5536   | 6143       | 5643   | 6674     | 3829      |
| 1971-72 | 5626                            | 5552   | 6143       | 5639   | 6684     | 3816      |
| 1972-73 | 5421                            | 5259   | 5775       | 5684   | 6380     | 3672      |
| 1973-74 | 5309                            | 4972   | 5783       | 4944   | 5529     | 3420      |
| 1974-75 | 5344                            | 4971   | 5772       | 4944   | 5553     | 3414      |

*Source:* Various reports of Directorate of Economics and Statistics (Ministry of Food and Agriculture), Govt. of India, New Delhi and Bureau of Economics and Statistics, Govt. of Kerala, Trivandrum.

Taking time as the independent variable and area/production/productivity as the dependent variable, both linear ( $y=a+bt$ ) and exponential ( $y=AB^t$  or  $\log y=a+bt$ , where  $a=\log A$  and  $b=\log B$ ) regression equations were fitted to the data and the corresponding growth rates (%) were also worked out. Since not much differences could be observed between the linear and exponential models of fit, estimates relating to the exponential equation alone have been considered for further discussion (Table 2).

**Table 2.** *Compound growth rates for area, production and productivity of coconut in India, Kerala and selected districts, 1957-58 to 1974-75*

| Country/<br>State/District | a               | Log y = a + bt<br>b | Growth<br>rate(%) | R <sup>2</sup> |
|----------------------------|-----------------|---------------------|-------------------|----------------|
| a) Area under coconut      |                 |                     |                   |                |
| India                      | 6.4652 (0.0127) | 0.0034 (0.0012)     | 3.394             | 0.9 806        |
| Kerala                     | 6.0961 (0.0140) | 0.0321 (0.0013)     | 3.260             | 0.9747         |
| Trivandrum                 | 3.9287 (0.0264) | 0.0255 (0.0024)     | 2.586             | 0.8724         |
| Quilon                     | 3.9747 (0.0147) | 0.0407 (0.0014)     | 4.156             | 0.9826         |
| Alleppey                   | 4.2346 (0.0218) | 0.0103 (0.0020)     | 1.031             | 0.6195         |
| Cannanore                  | 8.4036 (0.0466) | 0.0481 (0.0043)     | 4.930             | 0.8867         |
| b) Production of coconut   |                 |                     |                   |                |
| India                      | 8.3701 (0.0179) | 0.0201 (0.0017)     | 2.164             | 0.9022         |
| Kerala                     | 8.0363 (0.0332) | 0.0137 (0.0021)     | 1.379             | 0.7187         |
| Trivandrum                 | 5.8168 (0.0456) | 0.0187 (0.0042)     | 1.886             | 0.5519         |
| Quilon                     | 5.9331 (0.0313) | 0.0219 (0.0029)     | 2.209             | 0.7810         |
| Alleppey                   | 6.1940 (0.0453) | 0.0017 (0.0042)     | 0.166             | 0.0097         |
| Cannanore                  | 5.7941 (0.0531) | -0.0001 (0.0049)    | 0.005             | 0.0001         |
| c) Productivity of coconut |                 |                     |                   |                |
| India                      | 8.8127 (0.0116) | -0.0133 (0.0011)    | -1.317            | 0.9052         |
| Kerala                     | 8.8229 (0.0132) | -0.0167 (0.0012)    | -1.657            | 0.9215         |
| Trivandrum                 | 8.7871 (0.0186) | -0.0067 (0.0017)    | -0.673            | 0.4903         |
| Quilon                     | 8.8661 (0.0212) | -0.0189 (0.0020)    | -1.869            | 0.8533         |
| Alleppey                   | 8.8673 (0.0341) | -0.0086 (0.0031)    | -0.860            | 0.3196         |
| Cannanore                  | 8.9034 (0.0566) | -0.0482 (0.0052)    | -4.710            | 0.8418         |

Figures given in parenthesis are standard errors of estimates.

Data on percentage of bearing palms and mean yield of bearing palms for the state as well as the four districts in the state, during 1959 to 1966 were collected from the reports of the seven rounds of the survey conducted by the Bureau of Economics and Statistics, Trivandrum (Anon., 1965; 1966 and 1967).

## RESULTS AND DISCUSSION

### Growth rates for area, production and productivity

The compound rate of growth for area under coconut in Kerala (3.26%) was slightly lower than that of the country as a

whole (3.39%). This might be due to the restrictions contained in the Kerala Land Utilisation Act 1966 for converting wet lands to garden lands. Among the different districts considered, the rate of growth was highest in Cannanore (4.93%) followed by Quilon (4.16%) and it was lowest in Alleppey (1.03%). A low rate of area expansion for Alleppey is understandable because during 1957-58 itself, net area sown was about 85% of the total geographical area of the district, compared to 45% for the state and 44% and 37% for Quilon and Cannanore districts, respectively.

In none of the cases considered, the rate of growth for production was commensurate with that of area expansion. This could happen under two situations. In the first place, when there is a time lag between planting and obtaining yield, the effect of area expansion will not be immediately reflected in the total production. In the second place, this may be due to a real fall in the productivity of gardens.

The rate of growth for productivity (yield of nuts/ha) was negative in all cases. Compared to the country as a whole (1.32%), the decline was faster in the state (1.66%). Among the districts, the rate of decline in productivity was highest in Cannanore (4.71%) followed by Quilon (1.87%). A cross-comparison of rates of growth for area and productivity showed an inverse relationship between these two factors. The rate of expansion of area was highest in Cannanore and Quilon districts, the rate of decline in productivity was also highest in these two districts. Similarly, area expansion was low in Trivandrum and Alleppey districts. Decrease in productivity was also low in these two districts.

The four southern states, viz. Kerala, Tamil Nadu, Karnataka and Andhra Pradesh, together account for about 90% of the total production of coconut in the country. In most of the states, as well as at the all India level, the productivity was showing a declining trend, as observed in Kerala, (Table 3). Also, the productivity of coconut in Kerala was much lower than that of the other neighbouring states.

### **Changes in the age composition of palms**

When the productivity of palms is expressed as number of nuts per ha, palms in both bearing and pre-bearing stages are con-

**Table 3.** *Productivity of palms in some of the important coconut growing states in the country (nuts/ha)*

| Year    | All India | Kerala | Tamil Nadu | Karnataka | Andhra Pradesh |
|---------|-----------|--------|------------|-----------|----------------|
| 1964-65 | 5950      | 5864   | 9481       | 4036      | 8072           |
| 1965-66 | 5775      | 5617   | 10500      | 3131      | 8648           |
| 1966-67 | 5814      | 5618   | 10516      | 4204      | 6439           |
| 1967-68 | 5760      | 5626   | 10432      | 4146      | 5308           |
| 1968-69 | 5613      | 5590   | 8265       | 4147      | 5952           |
| 1969-70 | 5670      | 5589   | 8910       | 4767      | 4365           |
| 1970-71 | 5811      | 5336   | 9900       | 5616      | 4232           |
| 1971-72 | 5626      | 5552   | 8574       | 4838      | 4368           |
| 1972-73 | 5421      | 5259   | 8912       | 4808      | 4138           |

*Sources:* (i) Bulletin on Commercial Crop Statistics, 1963-64 to 1968-69 (Table 107); (ii) Bulletin on Commercial Crop Statistics, 1968-69 to 1971-72 (Table 107); (iii) Estimates of Area and Production of Principal Crops in India (1973-74) (Directorate of Economics and Statistics, Ministry of Food and Agriculture, Government of India, New Delhi).

sidered together. The coconut survey (Anon., 1965; 1966 and 1967) has revealed that, on an average, 0.5% of the palms are removed every year due to senility, diseases and other reasons; while the proportion of new seedlings planted every year is 2.8% of the total population. When the number of palms added increases at a higher rate, compared to the palms removed, it is only natural that the proportion of bearing palms in the population comes down and this has indirectly brought down the mean yield (number of nuts/ha). Therefore, it appears that yield per bearing palm would have been a better criterion for comparing the productivity of palms.

The percentage of bearing palms, as revealed by the coconut survey, is given in Table 4. Though the estimate for the state varied between 64.28 and 67.75% during the period 1959-66, a declining trend in the proportion of bearing palms could be noticed over the years. Such declining trend could be observed in the case of Trivandrum and Cannanore districts also. If the reduction in the bearing palms is also taken into consideration, the rate of decline

in productivity (expressed as number of nuts/ha) of palms will be less than what is revealed by official statistics.

**Table 4.** *Estimated percentage of bearing palms, 1959-60 to 1965-66*

| Year    | Kerala | Trivandrum | Quilon | Alleppey | Cannanore |
|---------|--------|------------|--------|----------|-----------|
| 1959-60 | 65.42  | 63.26      | 63.11  | 67.41    | 61.54     |
| 1960-61 | 67.02  | 62.36      | 65.92  | 66.28    | 67.29     |
| 1961-62 | 67.78  | 60.34      | 66.70  | 65.43    | 69.57     |
| 1962-63 | 66.01  | 58.89      | 68.78  | 69.34    | 62.87     |
| 1963-64 | 66.10  | 60.50      | 68.44  | 67.45    | 63.21     |
| 1964-65 | 65.11  | 57.83      | 67.93  | 71.85    | 60.33     |
| 1965-66 | 64.28  | 56.00      | 66.00  | 71.00    | 60.00     |

*Source:* Compiled from the "Comprehensive reports on the survey for the correct estimation of area index and production of coconut crop in Kerala", 1959-62, 1962-65 and 1965-66 (Bureau of Economics and Statistics, Trivandrum)

Estimates are available from the coconut survey for the average yield per bearing palm, for the seven year period 1959-66 (Table 5). This also showed a declining trend over the years in all the cases. However, in the case of Cannanore District, wide fluctuation in the estimates was noticed, accompanied by high variability.

**Table 5.** *Mean yield per bearing palm, 1959-60 to 1965-66*

| Year    | Kerala    | Trivandrum | Quilon    | Alleppey  | Cannanore |
|---------|-----------|------------|-----------|-----------|-----------|
| 1959-60 | 34 ( 4.2) | 34 (6.6)   | 38 ( 4.6) | 47 ( 5.6) | 24 (11.0) |
| 1960-61 | 32 ( 3.6) | 28 (3.3)   | 40 ( 9.4) | 36 (11.5) | 16 (10.9) |
| 1961-62 | 29 ( 3.0) | 33 (4.9)   | 35 ( 5.0) | 36 (16.2) | 22 (17.0) |
| 1962-63 | 27 ( 2.8) | 37 (5.6)   | 27 ( 5.4) | 28 (11.8) | 19 (11.3) |
| 1963-64 | 30 ( 3.1) | 32 (6.3)   | 30 (12.2) | 32 (12.6) | 24 ( 5.4) |
| 1964-65 | 29 ( 3.7) | 32 (6.9)   | 31 ( 9.8) | 32 ( 6.2) | 27 (14.8) |
| 1965-66 | 29 (10.8) | 31 (7.4)   | 32 (13.0) | 31 ( 5.4) | 26 ( 6.3) |

Figures given in parenthesis are S.E. (%)

*Source:* Same as that of Table 4.

### Unchecked expansion of area

During the period 1956 to 1975, the highest increase in wholesale prices has been registered by coconut (Anon., 1977b). This price factor as well as the ease with which coconut could be raised with little attention have led to large scale expansion of area, bringing marginal and unsuitable land also under cultivation. This could be seen from the changes in the land utilisation pattern during the period 1957-58 to 1974-75 (Table 6a). The net area sown in the state had shown an increase of 3.7 lakh ha (9.6%) during the period and there was a corresponding reduction of 1.34 lakh ha (3.5%) in barren and uncultivable land, 1.21 lakh ha (3.1%) in land under miscellaneous tree crops and 1.19 lakh ha (3.2%) in cultivable waste. The net area sown had increased at the expense of the above three categories of poor and marginal lands. Similar trends were noticed in the districts also. The distribution of addition to gross cropped area among the principal crops has been given in Table 6b. Considering the crops separately, the maximum area expansion has taken place in the case of coconut, at the state level, as well as in Quilon and Cannanore districts. In Trivandrum district also, the share of coconut in area expansion was high (41.3%). In Alleppey, only about 25% of the new area had been brought under coconut, because of the importance given there for food crops in general and rice in particular. In all the districts considered, as well at the state level, one-quarter to one-half of the area expansion was accounted for by coconut alone. Thus, a sizable portion of marginal lands and waste lands has been brought under coconut, during this period. This might partly explain the decline in the productivity of coconut gardens. Compared to Alleppey, area expansion has taken place in a substantial manner in Cannanore, by bringing under cultivation large areas of fallow (marginal) and waste lands and this has contributed to the sharp decline in productivity in this district.

### Poor planting materials

The coconut survey has shown that the new seedlings planted every year were, on an average, 2.8% of the total plant population. Out of this, according to the survey report, 8% alone were those obtained from government nurseries, whereas 18% of the seedlings were from private nurseries. Bulk of the planting material (70%)

**Table 6a.** *Changes (increase/decrease) in the pattern of land utilisation in Kerala, during 1957-58 to 1974-75*

| Classification                               | Kerala |      | Trivandrum |      | Quilon  |      | Alleppey |      | Cannanore |      |
|----------------------------------------------|--------|------|------------|------|---------|------|----------|------|-----------|------|
|                                              | a      | b    | a          | b    | a       | b    | a        | b    | a         | b    |
| 1. Forests                                   | 29     | 0.7  | -0.798     | -0.4 | -2.708  | -0.6 | 0        | 0    | -11.042   | -1.9 |
| 2. Land put to non-agriculture               | 94     | 2.4  | 4.976      | 2.3  | 6.358   | 0.7  | 2.130    | 1.2  | 25.789    | 4.4  |
| 3. Barren and uncultivable land              | -134   | -3.5 | -1.774     | -0.9 | -10.195 | -2.1 | -4.094   | -2.2 | -20.701   | -3.6 |
| 4. Permanent pastures and other grazing land | -20    | -0.5 | 0.550      | 0.3  | -1.700  | -0.3 | -0.601   | -0.4 | -10.138   | -1.7 |
| 5. Land under miscellaneous tree crops       | -121   | -3.2 | -0.285     | -0.2 | -4.834  | -1.0 | 1.358    | 0.7  | -11.554   | -2.0 |
| 6. Cultivable waste                          | -119   | -3.1 | -2.492     | -1.1 | -5.720  | -1.2 | -3.376   | -1.8 | -35.450   | -6.2 |
| 7. Fallow land, other than current fallows   | -62    | -1.7 | -2.354     | -1.1 | -2.876  | -0.6 | -0.882   | -0.5 | -33.413   | -5.7 |
| 8. Current fallows                           | -36    | -1.0 | -2.489     | -1.2 | -2.029  | -0.4 | -0.977   | -0.5 | -7.190    | -1.2 |
| 9. Net area sown                             | 370    | 9.6  | 4.660      | 2.1  | 23.704  | 5.0  | 6.442    | 10.3 | 103.689   | 18.0 |
| 10. Area sown more than once                 | 448    | 11.7 | 46.960     | 21.7 | 115.917 | 24.7 | 41.207   | 22.1 | -0.569    | -0.1 |

a: increase/decrease in area ('000 ha)

b: increase/decrease in area, expressed as percentage of total geographical area of the state/district.

**Table 6 b. Distribution of addition to gross area sown, among principal crops 1957-58 to 1974-75**

| Classification           | Kerala |       | Trivandrum |       | Quilon  |       | Alleppey |       | Cannanore |       |
|--------------------------|--------|-------|------------|-------|---------|-------|----------|-------|-----------|-------|
|                          | a      | b     | a          | b     | a       | b     | a        | b     | a         | b     |
| Coconut                  | 284.9  | 34.9  | 21.344     | 41.3  | 51.188  | 36.7  | 11.721   | 24.6  | 46.755    | 45.3  |
| Arecanut                 | 43.3   | 5.3   | 1.415      | 2.7   | 5.895   | 4.2   | 2.983    | 6.3   | 10.130    | 9.8   |
| Cashewnut                | 60.8   | 7.4   | 0.150      | 0.3   | 1.855   | 1.3   | 1.285    | 2.7   | 38.876    | 37.7  |
| Coffee                   | 19.9   | 2.4   | 0.042      | 0.1   | 0.042   | 0.03  | 0        | 0     | 4.642     | 4.5   |
| Rubber                   | 102.4  | 12.5  | 5.140      | 10.0  | 14.215  | 10.2  | 2.414    | 5.1   | 14.299    | 13.9  |
| Tapioca                  | 103.9  | 12.7  | 22.911     | 44.4  | 42.756  | 30.6  | -5.185   | -10.9 | 1.988     | 1.9   |
| Rice                     | 114.7  | 14.0  | 2.644      | 5.1   | 4.719   | 3.4   | 33.079   | 69.4  | -1.055    | -1.0  |
| Other crops              | 87.3   | 10.8  | -2.026     | -3.9  | 18.951  | 13.6  | 1.352    | 2.8   | 12.515    | -12.1 |
| Gross cropped area       | 817.2  | 100.0 | 51.620     | 100.0 | 139.621 | 100.0 | 47.649   | 100.0 | 103.120   | 100.0 |
| Food crops               | 398.8  | 48.8  | 25.118     | 48.7  | 72.144  | 51.7  | 41.098   | 86.3  | 36.051    | 35.0  |
| Non-food crops           | 418.4  | 51.2  | 26.503     | 51.3  | 67.477  | 48.3  | 6.551    | 13.7  | 67.069    | 65.0  |
| Net cropped area         | 369.5  |       | 4.660      |       | 23.704  |       | 6.442    |       | 103.689   |       |
| Area sown more than once | 447.7  |       | 46.960     |       | 115.917 |       | 41.207   |       | -0.569    |       |

a: addition to gross area sown ('000 ha)      b: share of the crop (percentage)

was raised in the cultivator's farm itself. The remaining 4% were those obtained from other sources. The farmers and owners of private nurseries do not generally adhere strictly to the selection standards fixed for selecting mother palms and seedlings. The position has not changed much even now. The total number of seedlings supplied from government nurseries during 1974-75 was five lakhs only (Anon., 1977c) against an estimated demand of 46 lakhs ( $7.48 \text{ lakh ha} \times 225 \text{ palms/ha} \times 2.8\%$ , proportion of new plantings). Thus the majority of seedlings planted are not of good quality and there is a need to improve the supply of quality planting material to arrest the decline in yield.

### **High density of palm population**

Another finding of the coconut survey relates to the palm population density in the gardens which varied from 220 to 250 per ha over the years. This is about 30 to 50% higher than the general recommended density. The plants growing under sub-optimal conditions are likely to suffer.

### **Poor management**

According to the coconut survey, the palms in about one per cent of the plots only were receiving chemical fertilisers. Though, nearly 50% of the plots received farm yard manure, the quantity involved was very low. Decline in productivity may be due to the depletion of nutrients in the soil. Balanced manuring with adequate quantity, at the appropriate time, is necessary to maintain the level of production of palms.

### **Incidence of pests and diseases**

The prevalence of root (wilt) disease in the central and southern districts of the state also might have adversely effected the productivity of palms. The disease has been slowly spreading towards south and north and this seems to have contributed to the decline in the productivity of palms. The total production of nuts has not shown any increase in Alleppey district, and the prevalence of root (wilt) disease may be one of the reasons for this stagnation.

The projected demand for coconuts at the end of the fifth plan period is about 7700 million nuts. By 1975-76, the country

had achieved a production of 6122 million nuts only. Unless the production level increases by 25% during the remaining plan period, the above target cannot be achieved. Adoption of improved production technology could help in improving production in the near future. The long range policy should ensure supply of quality planting materials in sufficient numbers and unscrupulous expansion of area under coconut should be discouraged. Emphasis should be given to systematic underplanting with quality seedlings, rather than on bringing marginal lands under coconut without adequate management. Thinning the existing plantations by cutting down the unproductive palms may also improve the productivity of the remaining palms. Pest and disease management along with balanced manuring and cultural operations would help to improve the productivity of palms.

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