

## Groundnut Rotation Experiment \*

by

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**Introduction:** The importance of rotation in crop production is well recognised. But this practice is not widely adopted in the Madras State probably due to the small size of the average holding of the cultivator. Groundnut being an important money crop of the drylands, is being grown year after year in the same land without any rotation. Judging from the present methods of harvest of the crop whereby the vines and some portion of the roots are removed from the soil, the practice of growing groundnut continuously in the same land is likely to have adverse effects though not immediately atleast in the course of some years. Where rotation is practised, it has been the experience of cultivators that crops following groundnut generally yield well. The spreading type of groundnut which is grown in rotation with *Varagu* (*Paspalum scrobiculatum*) by a few cultivators in South Arcot district is said to yield better than the same type of groundnut grown year after year without rotation. Rotations vary in the different producing areas depending upon a number of factors, such as, nature of soil, local conditions and demand, solvency of the cultivator, etc. In this State groundnut is generally rotated with cereals like *Cumbu* (*Pennisetum typhoides*), *Cholam* (*Sorghum vulgare*), *Varagu* and *Tenai* (*Setaria italica*) in dry lands. In favourable situations groundnut is followed in the same year by maize, *Varagu*, *Cholam*, cotton, gingelly and horsegram.

With the object of studying the effect of growing 1. groundnut on the succeeding crop of cereals like *Cholam*, *Cumbu* and *Varagu*, 2. cereals on the succeeding crop of groundnut and 3. which of the rotations is remunerative to the cultivator, the rotation experiment with groundnut was started at the Agricultural Research Station, Tindivanam in 1945 and is being continued. The experiment was carried out during the monsoon under rainfed conditions each year. The soil on which it is being conducted is light red sandy loam and is representative of the large portion of the dryland area of South Arcot and other neighbouring districts. The experi-

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ment has now been in progress for seven years ending 1951. The data relating to the first six years of the experiment and the results obtained therefrom are presented in this paper.

**Review of Previous Work:** A trial on the continuous growing of groundnut with and without manuring carried out for seven years at the old Palakuppam (near Tindivanam) Farm has shown that continuous cropping of groundnut without manuring reduces the yield (22 percent) and that to a marked extent in years of low and badly distributed rainfall (1935). Similar result was obtained at the Palur Farm where continuous growing of groundnut without rotation reduced its yield (1922). The beneficial effects of raising crops in rotation with groundnut have been reported by different workers. At the Hebbal Farm in Mysore, the yield of *Ragi* has been increased by 27 percent by growing it in rotation with groundnut (1930). Experiments conducted in black cotton soil of Berar have shown that growing cotton after groundnut resulted in 135 percent increase in its yield as compared with that grown continuously without rotation (1933). In Malaya, paddy grown after a groundnut crop recorded an increased yield of 24 percent over paddy grown after paddy (1950). In the experiment conducted at the Agricultural Research Station, Nandyal for six years to study the effect of different rotations on the main crop of the locality, viz., cotton, *Cholam* and groundnut, it was found that *Cholam* followed by groundnut gave the highest yield in grain and straw and that the effect of rotation on the yield of groundnut was negligible. Based on the results of the experiment, a three course rotation of *Cholam* groundnut and cotton is recommended for the tract in preference to the time honoured rotation of cotton and *Cholam*.

**Experimental Details:** The experiment consisted of the following eleven treatments:—

|   |                                   |
|---|-----------------------------------|
| Groundnut after groundnut   | <i>Cumbu</i> after groundnut      |
| Groundnut after <i>Cholam</i>   | <i>Varagu</i> after groundnut     |
| Groundnut after <i>Cumbu</i>  | <i>Cholam</i> after <i>Cholam</i> |
| Groundnut after <i>Varagu</i>   | <i>Varagu</i> after <i>Varagu</i> |
| <i>Cholam</i> after groundnut   | <i>Cumbu</i> after <i>Cumbu</i>   |
| Groundnut in the first season followed by gingelly in the second season of the same year. |                                   |

The last treatment was included in this trial as it forms one of the common rotations practised by the dryland cultivator of the tract where the Agricultural Research Station, Tindivanam is located.

Two series of experiments one with the short duration bunch type and the other with the long duration spreading type of groundnut are being conducted. The simple randomised blocks layout with four replications is being adopted. The size of the plots is 68' x 13' (gross) and 60' x 6' or 1/121 acre (net). TMV 2 bunch strain of groundnut is sown to a spacing of 6" x 6" while TMV. 3. spreading strain of groundnut is sown to a spacing of 9" x 9". The local varieties of the three cereals are sown in lines 1' apart with plants spaced 6" in the row. TMV. 1. strain of gingelly is sown

broadcast and the plants subsequently thinned to a spacing of about 9" between plant and plant.

**Data collected:** During the crop season, notes on the effects of the season, on growth, flowering and fruiting, incidence of pests and diseases, etc., are taken. Details of labour employed for the various field operations are recorded throughout the crop season as and when they are carried out. At harvest time the yield of grain and straw are recorded for each of the crops and for the individual plots. For purposes of comparison of yields, only the produce obtained from the net size of plots is utilised.

**Discussions:** (a) *Seasons:* During the period this experiment has been in progress, the seasonal conditions have not been normal. Under these conditions yield of the crops was not quite satisfactory. Among the two groundnut types, the long duration spreading type suffered more on account of the failure of the north-east monsoon during the last three years. The cereals were affected to a greater extent than groundnut. For want of rains, the sowing of the second crop of gingelly could not be done in the 'groundnut gingelly' plots during the last three years.

(b) *Yields:* The yield of the groundnut crop following other crops was compared with the yield of groundnut grown continuously year after year. Similarly, the yield of cereals grown after groundnut was compared with the yield obtained from their continuous cropping. Though the yield data of the six seasons are available yet the figures of the first year have been left out as it happens to be the basic year when no comparison between the treatments is possible. Hence only data of the remaining five seasons have been actually utilised for comparison of the different sets of treatments. A summary of the analyses of the yield data is presented in Table I.

In the bunch series, groundnut following cereals has given small increases in yield varying from 4.5 percent to 12.0 percent. But in the spreading series only groundnut following *Cumbu* has recorded an increase of 5.5 percent. Groundnut after *Cholam* and after 'groundnut - gingelly' has actually suffered certain reduction in yield in the latter series. But all these differences are not statistically significant. The experience of South Arcot cultivators of the groundnut crop giving increased yield when it follows a *Varagu* crop is not borne out by the data obtained in this experiment.

TABLE I

| Treatments   | BUNCH SERIES      |                         |  | SPREADING SERIES  |                         |   |
|--|-------------------|-------------------------|--|-------------------|-------------------------|---|
|  | Acro yield in lb. | Percentage over control | Significance of treatment differences (5% level) | Acro yield in lb. | Percentage over control | Significance of treatment difference (5% level) |
| (a) Yield of the groundnut crops (Average of five years) |                   |                         |  |                   |                         |   |
| Groundnut after groundnut                                | 884               | 100.0                   | —  | 843               | 100.0                   | —   |
| Groundnut after <i>Cholam</i>                            | 983               | 112.0                   | Not Significant                                  | 770               | 91.3                    | Not Significant                                 |
| Groundnut after <i>Cumbu</i>                             | 959               | 109.2                   | —  | 890               | 105.5                   | —   |
| Groundnut after <i>Varagu</i>                            | 935               | 106.5                   | —  | 849               | 100.7                   | —   |
| Groundnut after groundnut gingly                         | 917               | 104.5                   | —  | 812               | 96.3                    | —   |
| (b) Yield of Cereals (Average of five years)             |                   |                         |  |                   |                         |   |
| <i>Cholam</i> after <i>Cholam</i>                        | 327               | 100.0                   | Significant                                      | 426               | 100.0                   | Significant                                     |
| <i>Cholam</i> after groundnut                            | 732               | 223.8                   | —  | 714               | 167.6                   | —   |
| <i>Cumbu</i> after <i>Cumbu</i>                          | 282               | 100.0                   | Significant                                      | 268               | 100.0                   | Significant                                     |
| <i>Cumbu</i> after Groundnut                             | 402               | 142.6                   | —  | 433               | 161.0                   | —   |
| <i>Cumbu</i> after groundnut                             | 402               | 142.6                   | —  | 433               | 161.0                   | —   |
| <i>Varagu</i> after <i>Varagu</i>                        | 223               | 100.0                   | Significant                                      | 436               | 100.0                   | Not Significant                                 |
| <i>Varagu</i> after groundnut                            | 484               | 217.0                   | —  | 460               | 103.1                   | —   |

When the yields of cereals after groundnut are compared with cereals following cereals, the results are striking. The cereals after groundnut have recorded outstanding increase in yield of 43 percent to 124 percent over cereals which are grown year after year without rotation. These increases in yield are significant excepting in the spreading series where *Varagu* follows groundnut. This may probably be due to the poor stand observed in *Varagu* plots in certain seasons. This, however, requires further confirmation. From the above results it is evident that cereals grown in rotation with groundnut are greatly benefitted and give marked increase in yields over cereals after cereals. Of the three cereals, *Cholam* seems to derive maximum benefit by being grown after groundnut.

**Economics:** The cost of cultivation and the value of produce obtained for each of the crops were worked out each year and the

average net profit or loss per acre in rupees for each of the crops is given in the table below :

TABLE II  
Groundnut Rotation Experiment—Economics of Cultivation  
(Average of six years—five comparisons)

| Treatments                        | Bunch Series | Spreading Series |
|-----------------------------------|--------------|------------------|
| (a) Single Crops                  |              |                  |
| Groundnut after groundnut         | .. 82        | 73               |
| Groundnut after <i>Cholam</i>     | .. 107       | 60               |
| Groundnut after <i>Cumbu</i>      | .. 102       | 86               |
| Groundnut after <i>Varagu</i>     | .. 96        | 75               |
| (b) Comparison of the Rotations   |              |                  |
| <i>Cholam</i> after <i>Cholam</i> | .. 28        | 13               |
| <i>Cholam</i> after groundnut     | .. 123       | 78               |
| <i>Cumbu</i> after <i>Cumbu</i>   | .. 33        | 37               |
| <i>Cumbu</i> after groundnut      | .. 83        | 71               |
| <i>Varagu</i> after <i>Varagu</i> | .. 46        | 13               |
| <i>Varagu</i> after groundnut     | .. 81        | 63               |

Groundnut cultivation under the different systems of cropping has resulted in a fair margin of profit ranging from Rs. 60/- to Rs. 107/- per acre. The bunch groundnut following cereals has given a better return than the same type of groundnut grown year after year. Similar profit in the case of the spreading type has been obtained only when it follows a *Cumbu* crop. In the case of cereals, only *Cholam* following groundnut has registered a small profit. In all other cases, their cultivation has resulted in loss. This is due to the low yield obtained and to the valuation of their produce at controlled rates. When the rotations are compared with cereals following cereals the latter have resulted in loss while those following groundnut have recorded substantial profits. Maximum profit has been registered for 'groundnut—*Cholam*' rotation in both the series.

**Conclusion:** From the results of the analyses of the yield data relating to the experiment it is clear, that cereals following groundnut give comparatively high yields than cereals following cereals. The groundnut crop on the other hand does not seem to benefit to any appreciable extent by its being grown in rotation with the cereals. Groundnut cultivation has resulted in good monetary returns on

account of its high market value. The bunch groundnut following cereals has given better return than the same type grown year after year. Growing of cereals has generally resulted in loss excepting in the case of *Cholam* grown after groundnut. Considering the economics of the different rotations 'groundnut—*Cholam*' rotation appears to be the most profitable one for tracts where the bunch type of groundnut is largely grown.

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#### SNIPPETS

- "My wife has been using a fat-reducing roller for nearly two months now".
- "Yes, and can you see any results"?
- "Sure, the roller is much thinner".