APPENDIX II

Summary of Statistical Analyses.

(i) Insect population counts recorded 48 hours after the treatment.

	Treatments						SE_m	CD (P = ·01)
	A	B	C	D	E	F		
Adjusted mean insect population count ...	7·63	113·49	23·10	53	26·23	10·62	28·31	120·01

Conclusion: E, F, B, D, C, A.

APPENDIX III

Summary of results.

(ii) Insect population counts recorded one week after treatment.

A week after treatment, the insect counts were 'Nil' in treatments, A, B, C, and D. Only the data in respect of treatments E and F were therefore analysed.

Treatments	Mean insect counts	Standard error of mean	Critical difference (P. 0·01)
E.	107	29·73	345·56
F.	498	...	...

Conclusion: F, E.

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Utilisation of Farm Resources in Coimbatore Taluk

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Introduction: Farm production results from combining in various proportions the different factors of production land, labour, capital and management. Profit maximisation, then, is an attainable condition only when the farmer decides on the amounts and combinations of these four major resources of production. Any attempt to maximise farm profits, therefore, requires a prior knowledge of the productivity and returns of these resources used in farm production. So a study was undertaken in 1958–59 to estimate the nature of resource returns from a random sample of farms in Coimbatore taluk. Such information on resource utilisation and productivity will help to determine the quantity of particular categories of resources which should be employed and how the several resources should be combined for maximum production.

Materials and methods : The basic data used in the analysis was obtained by field enquires of 40 holdings drawn at random in Coimbatore taluk. The enquiry was restricted to cotton growing farms only in order to obtain a more homogeneous type of farms.

The statistics derived in the following analysis are based on Cobb-Douglas production function. It is a regression equation which is linear in logrithms and can be written as

$$Y = aX_1^{b_1} X_2^{b_2} X_3^{b_3}$$

Where Y refers to total value of the product and X^s refer to specified resources. The exponents b_1, b_2 and b_3 are the regression co-efficients of the input resources X_1, X_2 and X_3 respectively. Thus the production function equation for the sample drawn from the problem area has been derived as

$$Y = aX_1^{0.013} X_2^{0.381} X_3^{0.523}$$

Where Y refers to the total value of the crops produced on the farm ; x_1 refers to the area of land in acres ; X_2 is the quantity of labour used measured in man days and X_3 refers to value of all annual expenses (including seed, fertilizers, depreciation etc) expressed in rupees.

Interpretation of results : In the above equation the exponents show the elasticities of production for each single resource included. The elasticity of production indicates the percentage by which output increases as the resource is increased by one percent. In the case of labour used for crops, output is increased by 0.38 percent as labour input is increased by one percent (and other resources are held constant). Similarly a one percent increase in land and capital is followed by a corresponding increase of 0·013 and 0·523 percent output respectively. The elasticity co-efficients are less than one for each individual resource indicating that successive units of the resource, with other resources held constant add smaller and smaller quantities to the total value output ie. deminishing returns exist in this area in respect of each resource when increased with other resources fixed.

The value of regression co-officients or elasticities for the crop function are presented in the following table along with related statistics.

Elasticities and related statistics for crop function :

Item	Crop function
Value of constant 'a' (in log)	1·0355
Value of elasticities	
Land (b_1)	0·013
Labour (b_2)	0·381
Capital (b_3)	0·523
Sum of elasticities	0·917
Value of 't' for elasticities	
Land	0·960 **
Labour	3·120 *
Capital	2·790 *
Multiple co-efficient of determination R^2	0·761

* Significant at 5% level
** Not significant at 5% level.

All but land elasticity are significant at 5 percent probability level. This indicates that increasing the area of land alone without a rise in other resources, will not give any significant additional output to the total product, whereas the individual contribution by labour and capital is positive.

The adjusted co-efficient of multiple determination indicates the percentage of the variance in total product associated with the independent variables. In this case 76% of the variance was explained by the variables. The 'unexplained' portion of the variance in total product can be partly attributed to variations between farms in respect to techniques employed, weather conditions, prices received for products etc.

Scale returns : The nature of returns, if all resource services, viz. land, labour and capital are increased, can also be examined. One characteristic of the production function equation of Cobb-Douglas type is that if the exponents are summed, the total gives the percentage increase to the total product. If the sum of the co-efficients is greater than 1·0, an increase in all resources by 1 percent will increase the value of output by more than 1 percent (increasing returns); a sum equal to 1·0 means constant returns; while a sum less than one indicates diminishing returns. In the above equation if the regression co-efficients of land, labour and capital are added a total of 0·971 is obtained, which means that if

all the three resources are increased by 1 percent the value of output is increased by only 0·971 percent. Even here, farmers in Coimbatore taluk encounter diminishing returns to scale when all resources are increased in the same proportion.

Discussion: Many studies of this nature have been made on farm data based on the same technique of regression analysis of Cobb-Douglas type or other in the estimation of production functions (Heady, 1946; Heady, Mckee and Haves 1955; Heady and Russel shaw 1954; Suryanarayana 1958; Tolley, Black and Ezekeil 1924). Some of these studies indicate decreasing returns (1, 2, 4, 5, 8) while others indicate either constant or increasing returns to scale (2, 3, 4). Negative returns to scale, though rare, were also shown to have existed in Telengana farms (Suryanarayan 1958). So the exact nature of scale returns is still unknown but decreasing returns hold true for individual resources for all farm types in every region (1). In all these studies, however, management has not been included along with other input services since there is no objective measure of this productive agent. Production economists, notably Earl O. Heady, appear to think that it is likely that constant returns to scale should prevail if all factors including management could be increased and decreasing physical returns to scale are likely to be explained mainly in managerial limitations. It is the common knowledge that large farms normally require highly skilled management (1, 6, 7). But in this study the sample was drawn from all size groups and had it been possible to restrict the survey to either small or lage farms only, the effect of management might well have altered the results in respect of each size unit. However, assuming that management is a cost that varies in direct proportion with the acreage of farms, the general findings of declining nature of returns in this area over the wide range of farm sizes covered by the study is an indication to guide farmers into a more profitable utilisation of their resources. The farmers employ more labour and thereby get less returns. Instead if they invest more in capital in the form of labour saving equipment they can notonly reduce the labour employed but can also get better returns on capital thus invested.

Summary and Conclussion: A survey of farms in Coimbatore taluk was undertaken to find out the nature of resource returns in cotton farming areas. The statistical estimation of the production function study of the farm data indicates that farms in this area generally add marginal returns of diminishing nature as more and

more input resources are employed on the farms. These data also indicate that returns to labour and capital are positive while returns from land are very low. Assuming the managerial skill to be adequate on all sizes, these inferences derived from the sample of farms of different sizes in this area, will help farmers in an efficient reallocation of their resources more profitably.

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