Agric. Econ. Res. Rev. Vol. 4(2), 1991

Research Note

IMPACT OF TECHNOLOGICAL CHANGE ON EMPLOYMENT AND PRODUCTION RELATIONSHIP IN COTTON IN DHARWAD DISTRICT, KARNATAKA*

B.S. SULIGAVI,[1] H.G. SHANKARA MURTHY[2]

Introduction

A major breakthrough in agricultural production in the country was achieved only after the introduction of high yielding varieties of crops in the mid—sixties. Cotton has emerged as an important commercial crop with the evolution of high yielding varieties responding to fertilizer and other inputs. This has increased the income of farmers and employment potential, apart from raising the production level. Now the question arises, has this been true in case of rainfed cotton? The paper proposes to examine the impact of technological change in rainfed cotton on production relationships and employment in different farm size groups in Dharwad district, Karnataka State.

Methodology

The study was based on a stratified random sample of 135 farms of which 72 farmers grew HYV's and 63 farmers grew local cotton. The farmers in each category were further classified into two groups, small and large depending on the size of land holdings. The data related to the year 1986-87.

In order to study the production relations under different levels of technology namely, locals (Jayadhar) and hybrids (DCH-32), the following Cobb-Douglas type production function was fitted

$$\ln Y = \ln A + a_1 \ln (S+F) + a_2 \ln P + a_3 \ln K + a_4 \ln N + U$$

where, Y = Output of cotton (*Kapas*) measured in q/ha,

(S+F) = Cost of (Seed + Fertilizers) input measured in Rs./ha,

P = Cost of pesticides measured in Rs./ha,

* Based on the M.Sc. (Agri.) Thesis of first author submitted to University of Agricultural Sciences, Dharwad-580 005.

1 & 2. Department of Agricultural Marketing and Co-operation UAS, Dharwad, Karnataka.

K= Cost of capital services in Rs./ha, which includes bullock labour, labour cost, depreciation and land rent,

N= Labour cost in Rs./ha,

U= Random disturbance term,

A= Constant term and a_1, a_2, a_3 and a_4 are production elasticities.

'Chow' test (Chow, 1960) was used to work out whether the parameters governing the production relations in new technology farms were different from those of old technology farms. Again, to measure employment effects pairwise comparison of means between local and HYV-technology farms and within the technology, across farm size groups was carried out.

Results and Discussion

From Table 1, it is observed that the different input and output mean levels differed significantly between technology levels. With regard to yield levels, the HYV-technology was better by as many as three times as that of local-technology. It can also be seen that the new technology was not only high yielding, but also input use intensive in respect of all the four inputs.

From Table 2, it is seen that the new technology farms employed nearly 86 per cent more labour per hectare compared to old technology farms. Again when observed through disaggregative analysis, it was found that in new technology farms both the groups viz., small and large farms employed 96 per cent and 75 per cent more labour respectively, compared to old technology farms. This suggested that

Table 1. Sample geometric mean levels of yield and input levels in cotton production in Dharwad district during 1986-87

(Per hectare)

Sl. No.	Items	Jayadhar (Local variety)	DCH-32 (High yielding variety)
1.	Yield (Q.)	7.03	22.38
2.	Seeds+Fertilizers (Rs.)	184.75	372.41
3.	Plant protection chemicals (Rs.)	21.05	6081.21
4.	Capital (Rs.)	880.42	1604.99
5.	Labour (Rs.)	267.72	402.89

new technology farms in general absorbed more labour force than the old technology farms. It could also be noted that the percentage increase in labour use per hectare in new technology was higher on small farms, than that on large farms.

Table 2 further shows that the local technology farms employed more or less the same labour force in both small and large farms as shown by non-significant 't' value (0.64). Significant 't' value (9,16) indicated that the small and large farm employed different levels of labour force. The small farms employed 13 per cent more labour force than large farms in using new technology.

Table 2 Mean level of employment under HYV and local technology farms in Dharwad district during 1986-87

(man days per hectare)

Farm size	Number of observations		Employment		't' ratio	Percetage change in mean employment level in new technology
	HYV technology	Local technology	HYV technology	Local technology		
Pooled disaggregative analysis	72	63	60.49	32.52	92.78**	86
Small	38	36	64.27	32.80	38.71**	96
Large	34	27	56.71	32.23	27.16**	75

**Significant at one per cent level
NS Non –significant.
The 't' for the difference in mean employment between small and large farms under HYV technology was 9.16**. The 't' ratio for the difference in mean employment between small and large farms under local technology was 0.64^{NS}.

Results regarding the production relationships under different technologies are given in Table 3. It showed that there was significant structural break in shifting from local (old) technology to new technology.

The Chow test used depicted that the computed F-value 12.78 was found to be significant. It implied that there was a structural break in the production function of cotton in switching from local varieties to high yielding varieties. In other words, with the given level of inputs more output can be produced by HYV technology or the said output level can be produced with less use of inputs by applying new technology.

Table 3. Production function estimates and chow test for cotton production in Dharwad district during 1986-87

(Per hectare)

Samples	No. of observations	Intercept	Seeds+ fertilizers (Rs.)	Plant protection chcmicals (Rs.)	Capital (Rs.)	Labour (Rs.)	(Per hectare) R^2	F-ratio
High yielding varieties of cotton	72	2.907 (0.403)	0.280** (0.164)	0.362** (0.189)	0.055 NS (0.074)	0.299*** (0 153)	0 88	17.54**
Local varieties of cotton	63	1.413 (0.343)	0.210** (0.032)	—0.006 NS (0.014)	—0.018 NS (0.074)	0.810** (0.092)	0.97	14.92**
Pooled data	135	2.322 (0.253)	0.841*** (0.038)	0.169** (0.087)	—0.018 NS (0.059)	0.072 NS (0.079)	0.77	109.77**
SSE_1=4.642 (for HYV)			SSE_2=4.132 (for local)			SSE_3=12.30 (Pooled)		

***Significant at 10 per cent level

**Significant at one per cent level

NS Non significant

Figures in the parantheses indicate standard error for regression coefficients.

$$\text{Chow test} = \frac{SSE_3 - (SSE_1 + SSE_2)/R}{(SSE_1 + SSE_2)/(N + m - 2R)}$$

Where, n = no. of observations in HYV technology
m = no. of observations in local technology
R = no. of parameters estimated.

Conclusion

Since the small farms employed more of labour force, there was a need to reduce the inequalities in the distribution of land which becomes paramount. The technology impact on increased use of labour force as indicated by results, is a blessing on unemployed rural labour force. Lastly, an increase in the labour efficiency of large farms is called for, to facilitate a correct use of labour force. Here, a change in cropping system is relevant. In other words, adopting of HYV technology as risks barring technology is called for. The new technology also revealed that there was a visible change in production relations due to adoption of new technology. As new technology was input intensive as indicated, more use of inputs was called for. Again, the new technology used different inputs more efficiently than local varieties as indicated by Chow test.

Reference

Chow, G.G., 1960, "Tests of equality between means of coefficients in two linear regressions," *Econometrica*, 28(3) : 591-605.