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YIELD GAP ANALYSIS IN RICE : THANJAVUR DISTRICT

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ABSTRACT

Yield gap was estimated for rice in Thanjavur district for three regions (old delta, new delta and coastal regions) and for dominant varieties only, covering 90 respondents during *samba* season for the year 1990-91. Yield gap I was highest in ADT 39 (9.2 kg per ha) followed by CO 43 and CR 1009 (679.6 kg). Yield Gap II was highest in CR 1009 (2011.7 kg) followed by CO 43 and ADT 39 (1506.35 kg).

KEY WORDS : Rice, Yield gap, Thanjavur Delta.

In Tamil Nadu, rice occupied an area of about 2.23 million ha and production is estimated around 5.6 million tonnes. It stands eight in area and seventh in production among the Indian States. There is considerable yield variation due to differential adoption level of new technology, varying degrees of water control, imbalances in infrastructural development and other associated factors. Rajasekar (1987) estimated the yield gap for rice in (1064 kg/ha) in Madurai district.

Swaminathan (1977) identified three types of yield gap *viz.*, yield gap I, II and III for wheat crop. According to him, the gap between the yield possible on theoretical considerations and the best yield so for achieved can be referred to as yield gap I which represents 'research gap' yield gap II can be referred as 'research - cum - management gap' is the gap between the best yield obtained in a research farm and progressive farmers yield. The yield gap III is the difference between the best yield realised by a farmer in a state and the state's average yield and it can be called as 'extension gap'.

The specific objective of the study is to estimate the yield gap in rice in a major paddy growing area. Though several studies have been carried out in the past to estimate the yield gap, the changing socio-economic scenario and time warrants more and more studies on this aspect. Hence this study was envisaged.

MATERIALS AND METHODS

For this study, Thanjavur district was purposely selected and has been characterised into three agricultural divisions each one representing the old, new and coastal area.

Based on area and production of paddy, one block was selected for each of the old, new and

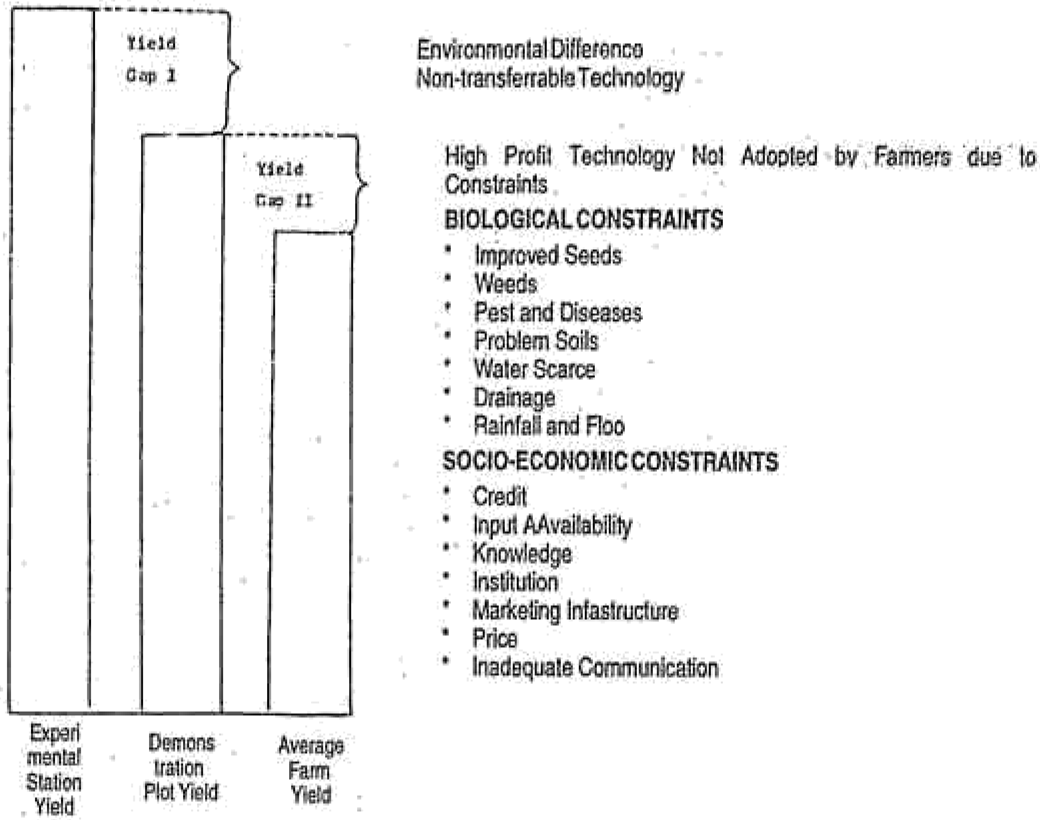

Fig. 1. Conceptual model for the yield gap

coastal areas. In each block, two villages were randomly selected and in each village, 15 sample respondents were randomly selected for this study. Thus, totally 90 respondents were interviewed personally for this study. The data were collected during the year 1990-91. The yield gap was divided into yield gap I which corresponds to difference between the experimental station yield and demonstration plot yield, whereas yield gap II corresponds to the difference between demonstration plot yield and farmers average yield. The conceptual model for the estimated yield gap is given in Fig.I.

Yield gap I might be due to the environmental differences between the experiment station and demonstration plot or by partial or non- transfer of technology. Yield gap II may be due to biological and socio-economic constraints. Biological constraints includes weeds, pest and diseases, problem soils, water scarcity, drainage, excess rainfall, own seeds, etc. Socio-economic constraints include credit, input availability, attitude, knowledge, traditional belief, marketing infrastructure and price, inadequate communication facility, etc.

Yield gap in paddy was determined for the three dominant varieties in each of the three regions during *samba* season. To examine the yield gap in rice, the weighted average of per hectare yield of paddy for each region and variety was calculated. The weight defined as the ratio of area under paddy in the i^{th} farm to the total area of all sample farms.

$$YF = \frac{\Sigma^n}{i=1} = \left(\frac{a_i}{A} x Y_i\right)$$

Where,

Y_F = Average yield at farm level in kg per ha.

a_i = Area under paddy in i^{th} farm in ha.

A = Total area of all sample farms in ha.

Y_i = Per ha yield of i^{th} farm in kg.

RESULTS AND DISCUSSION

To estimate the yield gap I, the yield data were collected from the Tamil Nadu Rice Research Institute, Aduthurai for experimental station yield, and the yield obtained in demonstration plots of the Department of Agriculture in the study area was considered for the demonstration plot yield. For the yield gap II, average demonstration plot yield was compared with average farm yield of *samba* season only.

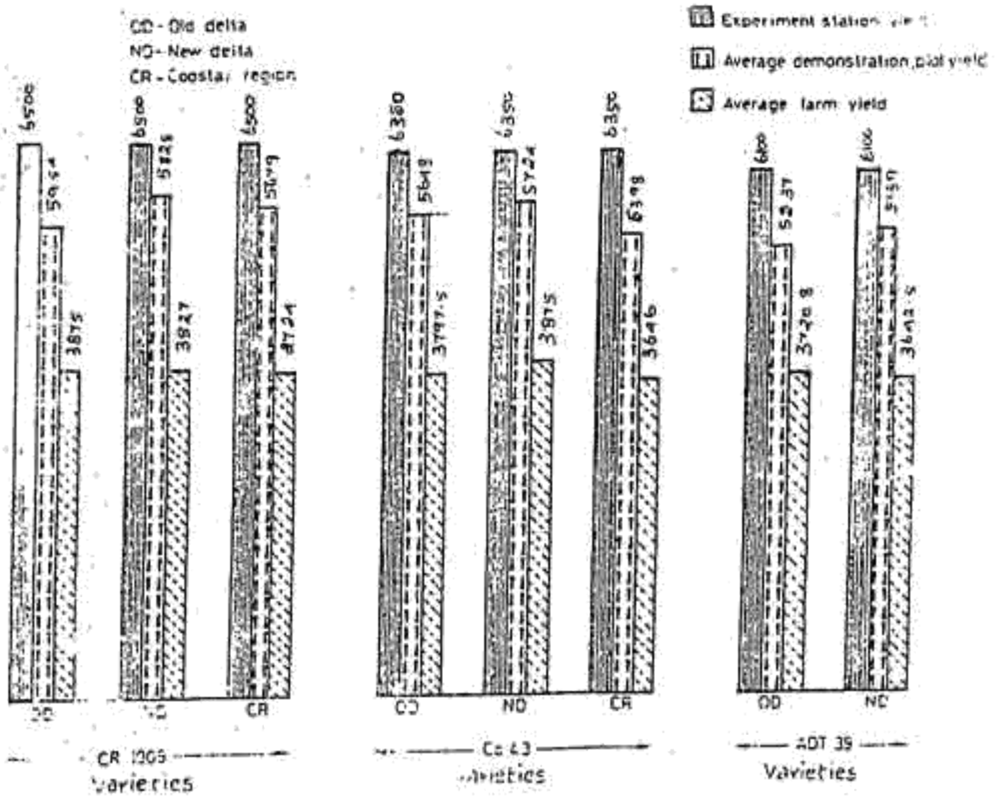

Fig. 2 Yield gap in rice for *samba* season

The yield gap particulars for rice is furnished in Table 1. It could be seen that there was considerable yield gap in rice. It was also observed that yield gap I was found to be lower than yield gap II. In *samba* season, the yield gap I was highest with 821 kg per ha in coastal area followed by new and old delta regions with 612 and 546 kg per ha respectively for CR 1009 (Ponmani) variety.

For CO 43 variety, the gap I was highest in coastal area with 952 kg per ha followed by old delta and new delta with 702 and 626 kg per ha, respectively. The reason for the highest yield gap I

Table 1. Yield gap in rice for *samba* season during 1989-90 (kg/ha).

Variety	Old delta	New delta	Coastal region	District
CR 1009 (Ponmani)				
Experiment station yield (ESY)	6500	6500	6500	6500
Average demonstration plot yield (DPY)	5954	5828	5679	5820.3
Yield gap I (ESY-DPY)	546	612	821	679.6
Farmers yield (FY)	3875	3827	2724	3808.6
GAP II (DPY-FY)	2079	2001	1955	2011.7
CO 43				
Experiment station yield (ESY)	6350	6350	6350	6350
Average demonstration plot yield (DPY)	5648	5724	5398	5590
Yield gap I (ESY-DPY)	702	626	952	760
Average farmers yield (FY)	3797.5	3875	3646	3772.8
Yield gap II (DPY-FY)	1850.5	1848	1752	1817.2
ADT 39				
Experiment station yield (ESY)	6100	6100	-	6100
Average demonstration plot yield (ESY)	5237	5139	-	5188
Yield gap I (ESY-DPY)	863	961	-	912
Av. farmers yield (FY)	3720.8	3642.5	-	3681.6
Yield gap II (DPY-FY)	1517.1	1496.5	-	1506.35

in coastal area might be due to regional difference in quality of water (salt water), poor drainage, climatic differences like heavy rainfall, cyclones, etc. As for as ADT 39 is concerned, gap I was highest with 961 kg in new delta followed by old delta with 863 kg per ha and it was not cultivated in coastal area.

As for as varietal difference is concerned, the CR 1009 was found to be the highest yielder with long duration and its gap was also found to be highest when compared to CO 43 and ADT 39. The reason may be the duration, yield characteristics of the variety, grain size, suitability of the variety to different regions, varietal preference of the farmers etc. For the district as a whole, the yield gap I was highest in ADT 39 (912 kg per ha) followed by C 43 (760 kg) and CR 1009 (679.6 kg). In contra the yield gap II was highest in CR 1009 (2011.7 I per ha) followed by CO.43 (3772.8) and ADT (1506.35 kg).

This study showed that yield gap was higher the old and new delta areas rather than the coast region which has more physical constraints.

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RESEARCH NOTES

VARIABILITY IN JAPANESE BARNYARD MILLET

Japanese barnyard millet *Echinochloa colona* var *frumentacea* is one of the small millets of India. It is also one of the quickest growing among millets coming to maturity in about six weeks of sowing under favourable conditions. The present study aims at assessing the genetic variability of barnyard millet for fodder yield.

Sixty varieties of barnyard millet were grown in a randomised block design replicated thrice in the main season during the year 1979 at the Millet Breeding Station, Coimbatore. The seeds were dibbled in the spacing of 30 cm and 15 cm between rows and plants and 20 plants were maintained per row. When 50 per cent of the populations came to flowering, five plants from each row at random were harvested for recording observations on eight characters, *viz.*, days to 50 per cent flowering, plant height, number of tillers, leaf length, leaf width, thickness of culm, dry matter yield and green fodder yield.

The mean components of coefficients of variability, heritability, genetic advance and genetic advance as per cent of mean (Johnson *et al.*, 1955) are presented in Table 1. Genotypic and phenotypic correlation among the characters were worked out and presented in Table 2. Low PCV estimates were obtained for days to flowering (14.45) plant height (18.02) and leaf width (23.65). The same trend wa reported by Abinash Yadav and Srivastava (1976) Also low GCV estimates were obtained for thes characters. In general PCV estimates and GC\ estimates maintained a linear trend and th differences were low. A comparison of th differences between PCV and GCV estimates fo the various traits indicated that stem girth followe by days to flowering and green fodder yield wer less susceptible to environment, indicating th greater role of genetic factor causing variability in these characters.

Most of the characters showed high heritability. Stem girth recorded the highest heritability followed by fodder yield, days to flowering and dry matter yield. The heritability was moderate in leaf width followed by number of tillers. Genetic advance was high for fodder yield followed by number of tillers and number of leaves. The highest value for genetic advance as per cent of mean was recorded for leaf width followed by leaf length and stem girth. The lowest value for GA as per cent of mean was recorded by plant height and days to flowering.

The present study disclosed an array of genotypic and phenotypic coefficient of variation for the characters studied. (Table 1). Among them,