



Research Article

IMPACT OF FRONT-LINE DEMONSTRATION (FLD) ON THE YIELD AND ECONOMICS OF BARNYARD MILLET IN MADURAI DISTRICT OF TAMIL NADU

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Abstract: Barnyard Millet is one of the preferred millet crops in Madurai District of Tamil Nadu. However, the productivity of barnyard millet is very low, due to lack of high yielding varieties and non adoption of integrated crop management practices. To replace this inconsistency of practices, Krishi Vigyan Kendra, Madurai has laid out ten Front Line Demonstrations in the farmer's field at Thirumangalam, Usilampatti and Sedapatti blocks. Farmers were provided improved crop management practices which resulted in higher yield than that obtained through the farmers' practices. The yield increase percentage in Front Line Demonstrations was 29.41 over farmers' practice.

Keywords: Barnyard millet, Yield, Economics, FLD

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Introduction

Barnyard millet (*Echinochloa frumentacea* L.) belonging to the family Poaceae is a commonly grown millet crop in the arid and semiarid regions of the world. In India, it is grown in the states of Uttaranchal, Tamil Nadu, Andhra Pradesh and Karnataka. Due to its remarkable ability to withstand weather conditions, it is a regular crop upto 2300 MSL during rainy season in Uttarakhand and Tamil Nadu and form a main stay of agricultural diet and cultural system of people in this region [1]. The high nutritional value of barnyard millet can make it doubly valuable as food for farming families and a potential source of income. In Tamil Nadu, barnyard millet is cultivated in the Districts of Madurai, Ramnad, Virudhunagar and Thirunelveli. Among the four districts, it is cultivated mainly in Madurai District in an area of 2270 ha [2].

On the darker side, millets are underutilized and neglected crops owing to their lower preference driven by affluence, longer time and efforts involved in processing and the lower cooking quality. Barnyard millet variety, MDU 1 is reported to have better cooking quality in terms of whitish grain, high iron content (16 mg / 100g of grain) besides having a short duration of 90 days.

Materials and Methods

The present study was carried out by Krishi Vigyan Kendra, Agricultural College and Research Institute, Madurai during kharif season of 2017-18 and 2018-19. Ten farmers were selected in Thirumangalam and Usilampatti blocks during 2017-18, seven in Sedapatti block and three in Thirumangalam block during 2018-19. Altogether twenty front line demonstration on cultivation of barnyard millet MDU 1 were laid out in one acre each totalling 8 ha respectively under rainfed condition. Training programme was imparted to the beneficiaries related to crop production technologies as a part of demonstration. The various aspects included in the frontline demonstration were introduction of new variety, integrated nutrient management, weed management, proper irrigation schedule, integrated pest management and harvesting. The detailed package of practices for the production of barnyard millet MDU 1 were given to the farmers to increase the awareness of improved technology and to increase productivity of barnyard millet. Yield data were collected both from farmers' practices and improved practices.

Cost of cultivation, gross return, net return and benefit cost ratio (B: C ratio) were computed and analysed. The technology gap and technology index were calculated using the following formula as given by Samui, *et al.*, (2000) [3].

Percent increase over farmers' practices = $\frac{\text{Improved practices (IP)} - \text{Farmers practices (FP)}}{\text{Farmers practices (FP)}} \times 100$

Technology index = $\frac{\text{Potential Yield} - \text{Demonstration Yield}}{\text{Potential Yield}} \times 100$

Technology gap = Potential Yield - Demonstration Yield

Extension gap = Demonstration yield - Yield under Farmers' Practices

B: C ratio = $\frac{\text{Net income (Rs. / ha)}}{\text{Cost of cultivation (Rs. / ha)}}$

Results and Discussion

Yield

The average yield of barnyard millet variety, MDU 1 under improved practices was 22 q/ha during 2017-18 and 21.99 q/ha during 2018-19. The yield was much higher compared to that of farmers' practices which was only 17 q/ha during 2017-18 and 19.72 q/ha during 2018-19. The average percentage of increase in the yield over farmer's practices was 29.41 and 11.5 respectively during 2017-18 and 2018-19. The results indicated that the Frontline Demonstration gave higher productivity due to the use of new variety coupled with improved cultivation practices creating an impact on the livelihood of Millet farmers of Madurai district [4-8].

Extension gap

The average extension gap in the improved practices was 5 q/ha during 2017-18 and 2.3 q/ha during 2018-19. This gap shows that there is need to educate the farming community about the improved crop management techniques. There is also need to educate the farmers about new high yielding varieties to replace the low yielding local or old varieties. This will increase the yield per capita and overcome the extension gap [Table-1]. The findings of the present study are in line with the findings of Thakur, *et al.*, (2017) [4], Hiremath and Nagaraju (2010) [9].

Table-1 Technology index, Technology gap and Extension gap of Barnyard millet, MDU 1

| Crop | Variety | Sowing method | Area (ha) | yield (q/ha) | | Increase over FP | Technology index (%) | Technology gap (q/ha) | Extension gap (q/ha) |
|-----------------|---------|---------------|-----------|--------------|-------|------------------|----------------------|-----------------------|----------------------|
| | | | | IP | FP | | | | |
| 2017-18 | | | | | | | | | |
| Barnyard millet | MDU 1 | Line sowing | 4 | 22 | 17 | 29.41 | 12 | 3 | 5 |
| 2018-19 | | | | | | | | | |
| Barnyard millet | MDU 1 | Line sowing | 4 | 21.99 | 19.71 | 11.5 | 12 | 3 | 2.3 |

Table-2 Economic impact of the demonstration

| Economics of demonstration (Rs./ha) | | | | Economics of check (Rs./ha) | | | |
|-------------------------------------|--------------|------------|-----------|-----------------------------|--------------|------------|-----------|
| Gross Cost | Gross Return | Net Return | BCR (R/C) | Gross Cost | Gross Return | Net Return | BCR (R/C) |
| 2017-18 | | | | | | | |
| 20615 | 44000 | 23385 | 2.13 | 14500 | 22500 | 8000 | 1.55 |
| 2018-19 | | | | | | | |
| 21403 | 39582 | 18179 | 1.85 | 19922 | 35496 | 15574 | 1.78 |

Table-3 Economic impact, Technology index, Technology gap and Extension gap of Barnyard millet, MDU 1 during 2017-18

| SN | Name of Farmer | Village | Dist/Block | Variety | Crop | Area (ha) | IP Yield(q/ha) | FP Yield(q/ha) | Net Income(Rs/ha) | B:C Ratio | IOFP(%) | TI(%) | TG (q/ ha) | EG (q/ ha) |
|----|-----------------|---------------|------------|---------|-----------------|-----------|----------------|----------------|-------------------|-----------|---------|-------|------------|------------|
| 1 | S. Deivamsam | Mathippanur | Madurai | MDU 1 | Barnyard millet | 0.4 | 24 | 17 | 26571 | 2.15 | 33.33 | 4 | 1 | 6 |
| 2 | R. Ramu | Mathippanur | Madurai | MDU 1 | Barnyard millet | 0.4 | 19 | 18 | 20199 | 2.10 | 18.75 | 24 | 6 | 3 |
| 3 | R. Thyagarajan | Marudangudi | Madurai | MDU 1 | Barnyard millet | 0.4 | 22 | 16 | 23385 | 2.13 | 22.22 | 12 | 3 | 4 |
| 4 | R. Kalavathi | Marudangudi | Madurai | MDU 1 | Barnyard millet | 0.4 | 20 | 18 | 21261 | 2.11 | 25.00 | 20 | 5 | 4 |
| 5 | Sakthivel | Sathangudi | Madurai | MDU 1 | Barnyard millet | 0.4 | 21 | 16 | 22323 | 2.12 | 23.53 | 16 | 4 | 4 |
| 6 | P. Kalaiselvi | Erumapatty | Madurai | MDU 1 | Barnyard millet | 0.4 | 24 | 17 | 25509 | 2.15 | 33.33 | 4 | 1 | 6 |
| 7 | S. Rajathi | Rengasampatti | Madurai | MDU 1 | Barnyard millet | 0.4 | 20 | 17 | 21261 | 2.11 | 25.00 | 20 | 5 | 4 |
| 8 | S. Maharajan | Vellalapatti | Madurai | MDU 1 | Barnyard millet | 0.4 | 24 | 17.5 | 24447 | 2.15 | 33.33 | 4 | 1 | 6 |
| 9 | S. John Amalraj | Vadipatti | Madurai | MDU 1 | Barnyard millet | 0.4 | 22 | 16.5 | 23385 | 2.12 | 37.50 | 12 | 3 | 6 |
| 10 | M. Ayyavu | Thirumangalam | Madurai | MDU 1 | Barnyard millet | 0.4 | 24 | 17 | 25509 | 2.14 | 33.33 | 4 | 1 | 6 |

Table-4 Economic impact, Technology index, Technology gap and Extension gap of Barnyard millet, MDU 1 during 2018-19

| SN | Name of Farmer | Village | Dist/Block | Variety | Crop | Area (ha) | IP Yield(q/ha) | FP Yield(q/ha) | Net Income(Rs/ha) | B:C Ratio | IOFP(%) | TI(%) | TG (q/ ha) | EG (q/ ha) |
|----|-----------------|------------------|------------|---------|-----------------|-----------|----------------|----------------|-------------------|-----------|---------|-------|------------|------------|
| 1 | M.Muthukumar | Thirumanikkam | Madurai | MDU 1 | Barnyard millet | 0.4 | 20.4 | 18.0 | 13500 | 1.71 | 13.33 | 18.4 | 4.6 | 7.0 |
| 2 | M. Rajendran | Thirumanikkam | Madurai | MDU 1 | Barnyard millet | 0.4 | 22.5 | 20.2 | 16090 | 1.79 | 10.84 | 10.0 | 2.5 | 4.7 |
| 3 | S.Venkittammal | Thirumanikkam | Madurai | MDU 1 | Barnyard millet | 0.4 | 21.2 | 20.0 | 15500 | 1.76 | 6.0 | 15.2 | 3.8 | 5.0 |
| 4 | M. Nagammal | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 21.2 | 19.8 | 14440 | 1.68 | 7.07 | 15.2 | 3.8 | 5.2 |
| 5 | M. Brindha | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 22.5 | 20.5 | 16750 | 1.83 | 9.76 | 10 | 2.5 | 4.5 |
| 6 | P.Radhakrishnan | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 21.5 | 19.2 | 15460 | 1.81 | 11.98 | 14 | 3.5 | 5.8 |
| 7 | C. Murali | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 23.0 | 20.5 | 16650 | 1.82 | 12.2 | 8.0 | 2.0 | 4.5 |
| 8 | M. Chinnaasamy | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 21.3 | 20.0 | 16500 | 1.85 | 6.5 | 14.8 | 3.7 | 5.0 |
| 9 | R. Alagarsamy | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 22.8 | 19.3 | 15320 | 1.79 | 18.13 | 8.8 | 2.2 | 5.7 |
| 10 | A. Thavasi | T.Ramanathapuram | Madurai | MDU 1 | Barnyard millet | 0.4 | 23.5 | 19.6 | 15530 | 1.79 | 19.9 | 6.0 | 1.5 | 5.4 |

Technology gap

The average technology gap in the improved technology was found to be 3 q/ha during both the years of study. It might be due to the difference in the climatic and edaphic conditions which would have increased the technology gap. Similar findings were reported by Thakur, *et al.*, (2017) [4], Raj, *et al.*, (2013) [8].

Technology index

The technology index shows the feasibility of the evolved technology at the farmers' field and the lower the value of technology index more is the feasibility of the technology. The index was found to be 12 percent for barnyard millet during the entire period of this study.

Economic return

The price of the inputs and produce prevailed during the study of demonstration were taken for calculating cost of cultivation, gross return, net return and benefit: cost ratio [Table-2]. The demonstration of barnyard millet under improved practices gave higher net return and B: C ratio of Rs. 23385/ ha and 2.13 during 2017-18 and of Rs.18179/ ha and 1.85 during 2018-19. This might be due to higher yield obtained from the improved technology as compared to farmers' practices. This finding is also reported by Raj, *et al.*, (2013) [8] Mokidue, *et al.*, (2011) [10]. In the present study increased B:C ratio was due to increased yield and there by income and was reported by Rawat, *et al.*, (2019) [11].

Application of research: Study of economics of Barnyard Millet

Research Category: Agriculture Economics

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Study area / Sample Collection: Thirumangalam and Usilampatti blocks, Sedapatti block, Tamil Nadu

Cultivar / Variety / Breed name: Barnyard millet (*Echinochloa frumentacea* L.)

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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