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# Stubble cropping as a method of conservation of native rices

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***Abstract:*** *Production of an additional crop from ratoon plants is being practiced in some rice farming areas of the world to produce a second crop from the stubbles of a harvested rice crop. Tiller production from stubbles can be enhanced by splitting the stubbles and planting them separately. While ratoon cropping can be used to produce an additional crop with lesser investment, planting of separated stubbles can be used as a conservation technique both under normal and critical conditions. Under normal conditions, this technique can be used to enhance the availability of seeds from a crop especially in conservation protocols where the number of plants raised in the crop of each variety is low. Under critical condition of drought, flood or other cases of habitat destruction, this technique can be used to develop more number of plants and seeds from the few materials rescued from the stress or disaster. Regneration of stubbles is a varietal character. Many nativerice varieties of Kerala show good response to stubble cropping. The present study was carried out with five native rice varieties Kunhukunheu, Thondi, Ponmani, Chitteni and Ponnariyan which show comparatively good ratoon performance by stubble cropping. The number of days to flower and duration of the stubble crop showed significant reduction indicating the possibility of early harvest of the stubble crop.*

## INTRODUCTION

Ratoonability is an ancestral character of rice inherited from its wild progenitors which helps to perennate even under adverse conditions. Ratoon cropping from stubbles can be used to produce a second crop with lesser investment under normal and critical conditions. Tiller production from stubbles can be enhanced by splitting the stubbles and planting them separately since stubble cropping can be considered as an advanced method in ratoon cropping (Richharia and Pavithran, 1987). This technique can be used to enhance the availability of seeds from a crop especially in conservation protocols and critical conditions of draught, flood and insect and pest damages. Unexpected pests and viruses often devastate entire areas, leaving the farmer with neither food nor income and sometimes with debt. While conservation of native rices is important as they are potential sources of rare and valuable genes, this method can be utilized among small farming communities to get an additional income.

## MATERIALS AND METHOD

Rice seeds collected from farmers were grown under experimental conditions in the net house of the Genetics and Plant Breeding Division of Department of Botany, University of Calicut during the first crop season of 2005-2006. Five native rice varieties *Kunhukunhu*, *Thondi*, *Chitteni*, *Ponmani* and *Ponnariyan* were used for stubble cropping. The plants for the mother crop were grown in pots of 20cm diameter filled with paddy soil + sand + enriched compost in 4:1:1 proportion under wet land condition with one plant per pot applying 1g factomfos per plant at monthly intervals starting from the $30^{th}$ day onwards till flowering. Observations on growth and yield characters were recorded and the crop harvested at maturity. After harvest, the stubbles of the parent crop were separated and planted under same planting conditions to raise a crop from the stubbles. Data on vegetative and yield characters of the stubble crop were recorded and analyzed in comparison with the seed crop (Table 1).

Table 1. Vegetative and yield characters of seed crop and stubble crop in the case of the varieties studied.

| Varitey | Character | Seed crop/stubble crop | Mean | SD | CV | Level of Significance |
|---|---|---|---|---|---|---|
| *Kunhukunhu* | Days to flower | Seed crop | 89.67 | 1.53 | 1.70 | 1% |
| | | Stubble crop | 41.67 | 10.21 | 24.50 | |
| | Tiller number | Seed crop | 11 | 1.73 | 15.73 | NS |
| | | Stubble crop | 7.33 | 2.71 | 36.97 | |
| | EBT% | Seed crop | 85.63 | 7.56 | 8.83 | NS |
| | | Stubble crop | 83.8 | 14.67 | 17.51 | |
| | Duration (days) | Seed crop | 119.67 | 10.94 | 9.14 | 1% |
| | | Stubble crop | 71.67 | 8.47 | 12.33 | |
| | Plant height (cm) | Seed crop | 65.8 | 3.45 | 5.24 | NS |
| | | Stubble crop | 56 | 7 | 12.5 | |
| | Panicle length (cm) | Seed crop | 21.67 | 0.86 | 3.97 | NS |
| | | Stubble crop | 14.33 | 2.95 | 20.59 | |
| | Panicle density | Seed crop | 5.88 | 0. 76 | 12.93 | NS |
| | | Stubble crop | 2.87 | 0.93 | 32.40 | |

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|---|---|---|---|---|---|---|
| | Spikelets per panicle | Seed crop | 127.67 | 18.93 | 14.83 | 1% |
| | | Stubble crop | 42.33 | 19.86 | 46.92 | |
| | Seeds per panicle | Seed crop | 110.67 | 14.57 | 13.17 | 1% |
| | | Stubble crop | 39 | 19 | 48.72 | |
| | Hundred grain weight (g) | Seed crop | 1.22 | 0.14 | 11.15 | 1% |
| | | Stubble crop | 1.79 | 0.12 | 6.70 | |
| | Fertility % | Seed crop | 86.84 | 1.59 | 1.83 | NS |
| | | Stubble crop | 91.54 | 2.85 | 3.11 | |
| | Yield per plant (g) | Seed crop | 15.45 | 5.91 | 38.25 | NS |
| | | Stubble crop | 5.16 | 4.77 | 92.64 | |
| *Thondi* | Days to flower | Seed crop | 127.33 | 5.51 | 4.33 | 1% |
| | | Stubble crop | 81 | 10.39 | 12.83 | |
| | Tiller number | Seed crop | 21.67 | 5.51 | 25.43 | NS |
| | | Stubble crop | 5.33 | 3.21 | 60.23 | |
| | EBT% | Seed crop | 65.9 | 8.12 | 12.32 | NS |
| | | Stubble crop | 81.5 | 9.03 | 11.08 | |
| | Duration (days) | Seed crop | 119.67 | 10.94 | 9.14 | 1% |
| | | Stubble crop | 71.67 | 8.47 | 11.82 | |
| | Plant height (cm) | Seed crop | 101.67 | 4.04 | 3.97 | NS |
| | | Stubble crop | 102.67 | 31.57 | 30.75 | |
| | Panicle length (cm) | Seed crop | 25.07 | 3.09 | 12.38 | NS |
| | | Stubble crop | 24.4 | 4.69 | 19.22 | |
| | Panicle density | Seed crop | 2.65 | 0.29 | 11.06 | NS |
| | | Stubble crop | 5.85 | 1.38 | 23.59 | |
| | Spikelets per panicle | Seed crop | 65.67 | 0.58 | 0.88 | NS |
| | | Stubble crop | 147 | 57.19 | 38.91 | |
| | Seeds per panicle | Seed crop | 45.67 | 0.58 | 1.27 | NS |
| | | Stubble crop | 130.33 | 48.01 | 36.84 | |
| | Hundred grain weight (g) | Seed crop | 1.67 | 0.09 | 5.21 | 1% |
| | | Stubble crop | 2.19 | 0.1 | 4.57 | |
| | Fertility percentage | Seed crop | 63.38 | 5.06 | 7.98 | 1% |
| | | Stubble crop | 89.40 | 3.83 | 4.28 | |
| | Yield per plant (g) | Seed crop | 15.21 | 1.0 | 6.58 | NS |
| | | Stubble crop | 14.50 | 12.10 | 83.45 | |
| *Ponmani* | Days to flower | Seed crop | 185.33 | 7.51 | 4.05 | 1% |
| | | Stubble crop | 65.33 | 2.80 | 4.29 | |
| | Tiller number | Seed crop | 39.33 | 10.02 | 25.48 | NS |
| | | Stubble crop | 13 | 5.2 | 40 | |
| | EBT% | Seed crop | 80.9 | 8.64 | 10.68 | NS |
| | | Stubble crop | 69.3 | 11.07 | 15.97 | |
| | Duration (days) | Seed crop | 215.33 | 7.50 | 3.48 | 1% |
| | | Stubble crop | 95.33 | 2.08 | 2.18 | |
| | Plant height (cm) | Seed crop | 76.9 | 9.65 | 12.55 | NS |
| | | Stubble crop | 77.33 | 9.02 | 11.66 | |
| | Panicle length (cm) | Seed crop | 16.25 | 0.88 | 5.42 | NS |
| | | Stubble crop | 17.6 | 2.33 | 13.24 | |
| | Panicle density | Seed crop | 2.02 | 0.40 | 19.80 | NS |
| | | Stubble crop | 2.62 | 0.85 | 32.44 | |
| | Spikelets per panicle | Seed crop | 33 | 7.94 | 24.06 | NS |
| | | Stubble crop | 50.33 | 20.00 | 39.74 | |
| | Seeds per panicle | Seed crop | 28.67 | 6.03 | 21.03 | NS |
| | | Stubble crop | 45.67 | 21.13 | 46.27 | |
| | Hundred grain weight ( | Seed crop | 1.67 | 0.09 | 52.10 | 1% |
| | | Stubble crop | 2.19 | 0.10 | 4.57 | |

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|---|---|---|---|---|---|---|
| | Fertility percentage | ) crop | 87.78 | 9.18 | 10.46 | NS |
| | | Stubble crop | 89.37 | 6.83 | 7.64 | |
| | Yield per plant (g) | Seed crop | 15.29 | 3.12 | 20.41 | NS |
| | | Stubble crop | 8.09 | 2.27 | 28.06 | |
| *Chitteni* | Days to flower | Seed crop | 196.67 | 2.89 | 1.47 | 1% |
| | | Stubble crop | 27.33 | 10.21 | 37.36 | |
| | Tiller number | Seed crop | 35.33 | 0.58 | 1.64 | 1% |
| | | Stubble crop | 21 | 3.61 | 17.20 | |
| | EBT% | Seed crop | 63.13 | 5.35 | 8.48 | NS |
| | | Stubble crop | 58.87 | 5.32 | 9.04 | |
| | Duration (days) | Seed crop | 226.67 | 2.89 | 1.27 | 1% |
| | | Stubble crop | 57.33 | 10.21 | 17.91 | |
| | Plant height (cm) | Seed crop | 102.77 | 5.50 | 5.35 | 1% |
| | | Stubble crop | 79.17 | 2.47 | 3.12 | |
| | Panicle length(cm) | Seed crop | 16.93 | 0.4 | 2.36 | NS |
| | | Stubble crop | 16.3 | 2.0 | 12.27 | |
| | Panicle density | Seed crop | 2.15 | 0.05 | 2.33 | NS |
| | | Stubble crop | 2.17 | 0.52 | 23.96 | |
| | Spikelets per panicle | Seed crop | 36.33 | 1.53 | 4.21 | NS |
| | | Stubble crop | 39.67 | 15.7 | 39.58 | |
| | Seeds per panicle | Seed crop | 32.67 | 3.51 | 10.74 | NS |
| | | Stubble crop | 36.67 | 16.65 | 45.41 | |
| | Hundred grain weight (g) | Seed crop | 1.98 | 0.17 | 8.59 | NS |
| | | Stubble crop | 2.06 | 1.44 | 69.90 | |
| | Fertility percentage | Seed crop | 85.27 | 2.12 | 2.49 | NS |
| | | Stubble crop | 90.43 | 7.59 | 8.39 | |
| | Yield per plant (g) | Seed crop | 13.98 | 2.67 | 19.1 | NS |
| | | Stubble crop | 9.33 | 4.85 | 51.98 | |
| *Ponnariyan* | Days to flower | Seed crop | 99 | 2.65 | 2.68 | 1% |
| | | Stubble crop | 75 | 3.46 | 4.61 | |
| | Tiller number | Seed crop | 15 | 3.46 | 23.07 | NS |
| | | Stubble crop | 6.67 | 2.52 | 37.78 | |
| | EBT% | Seed crop | 80.97 | 9.94 | 12.28 | NS |
| | | Stubble crop | 84.27 | 13.7 | 16.26 | |
| | Duration (days) | Seed crop | 131.33 | 5.51 | 4.2 | 1% |
| | | Stubble crop | 105 | 3.46 | 3.3 | |
| | Plant height (cm) | Seed crop | 109.07 | 4.76 | 4.36 | NS |
| | | Stubble crop | 106 | 8 | 7.55 | |
| | Panicle length (cm) | Seed crop | 23.27 | 2.1 | 9.02 | NS |
| | | Stubble crop | 21.63 | 1.3 | 6.01 | |
| | Panicle density | Seed crop | 4.39 | 0.44 | 10.02 | NS |
| | | Stubble crop | 4.31 | 0.27 | 6.27 | |
| | Spikelets per panicle | Seed crop | 102.33 | 16.43 | 16.06 | NS |
| | | Stubble crop | 92 | 6.25 | 6.79 | |
| | Seeds per panicle | Seed crop | 93.67 | 14.36 | 15.33 | NS |
| | | Stubble crop | 82.67 | 6.81 | 8.24 | |
| | Hundred grain weight (g) | Seed crop | 1.93 | 0.19 | 9.85 | NS |
| | | Stubble crop | 2.17 | 0.31 | 14.29 | |
| | Fertility percentage | Seed crop | 93.6 | 2.88 | 3.08 | NS |
| | | Stubble crop | 88.83 | 4.32 | 4.86 | |
| | Yield per plant (g) | Seed crop | 21.63 | 5.25 | 24.27 | NS |
| | | Stubble crop | 9.98 | 4.61 | 46.19 | |

## RESULTS AND DISCUSSION

Days to flower and duration showed significant reduction in all the varieties in the case of the ratoon crops indicating the possibility of earlier harvest. The earliest flowering variety among stubble plants was *chiteeni* (27 days) and latest was *thondi* (81days). Number of tillers in the stubble crop ranged from 5.33 – 21 with minimum in *thondi* and maximum in *chitteni*. Percentage of ear bearing tillers ranged in the stubble crop from 58.87 to 84.27. Plant height was the minimum in *kunhukunhu* (56 cm) and maximum in *ponnariyan* (106 days). Panicle length was the maximum (24.4 cm) in *thondi* and minimum (14.33cm) in *kunhukunhu*. Only the variety *chitteni* showed significant reduction in plant height and tiller number and the other varieties showed no significant reduction. Spikelets per panicle was minimum (39.67) in *chitteni* and maximum in *thondi* (147). Seeds per panicle was the minimum (36.67) in *chitteni* and maximum in *thondi* (130.33). Spikelets/ panicle and seeds per panicle showed significant reduction in *kuhukunhu* only. Hundred grain weight showed significant reduction in *kunhukunhu*, *thondi* and *ponmani*. Yield per plant ranged from 5.16 g – 14.60 g with a minimum in *kunhukunhu* and maximum in *thondi*, but with no significant reduction in the ratoon crop. Regeneration of stubbles is a varietal character (Mohanan and Pavithran, 1993) and from stubbles seed production can be enhanced as it can be used as a method of seed recovery especially when the conserved germplasm faces threat of habitat destruction, natural calamities and stress resulting in reduction of available quantity of seeds for conservation.

## REFERENCES

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