

# EFER33

## Genetic Variation for Grain Yield and Straw Quality Traits in 31 Diverse Rice Varieties in Assam

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**MINI ABSTRACT:** Grain and straw productivity and straw quality traits were investigated amongst 31 rice varieties cultivated in Assam. Highly significant ( $P < 0.0001$ ) differences were found in all traits. Grain yield and straw yield ranged from 3.5 to 5.8 t/ha, and SY from 5.4 to 8.9 t/ha and were positively correlated ( $r = 0.51, 0.003$ ). None of the straw quality traits were significantly associated with GY, where as SY was positively associated with metabolizable energy ( $r = 0.59, P = 0.0005$ ). *In vitro* organic matter digestibility was not significantly correlated with GY suggesting that varieties can be bred simultaneously for both traits. In fact, the variety with the highest straw IVOMD was among the ten highest grain yielders.

**Keywords:** Grain yield, *In vitro* digestibility, Rice straw

## BACKGROUND

Rice straw is an important fodder source for livestock, providing more than 30% of all the fodder from crop residues in India and constituting the bulk of livestock fodder in the rainfed parts of the Indo-Gangetic-Plain and in southern India. The fodder quality of rice straw is often low, although it can be improved with available technologies. The more recent research paradigm holds that the improvement of fodder quality of rice crop residues through plant breeding and selection is a more promising route to improved livestock production (Blümmel *et al.*, 2006; Blümmel *et al.*, 2020). Consequently, fodder value (quantity and quality) of the crop residue has become an integral part of plant breeding and selection in multidimensional crop improvement.

## METHODOLOGY

The field experiments were conducted with technical support from the International Rice Research Institute (IRRI), Assam, during the two consecutive *khariif/Sali* seasons (June to December) of 2019 and 2020. A total of 31 rice varieties were investigated for grain yield, straw yield and straw quality traits. Straw samples were collected from each of the harvested plots, at grain maturity, from yield trials established in a randomized block design with three replications. Statistical analysis was carried out across two years, as two seasons using Statistical Analysis Software4). The samples were scanned with a Near Infrared Reflectance Spectroscopy (NIRS), FOSS Forage Analyzer XDS, installed with WinISIII software package and specifically developed calibration equations. Predictions were made for straw quality traits.

## RESULTS

Ranges in grain yield (GY) 3.5-5.8 t/ha, straw yield (SY) 5.4-8.9 t/ha, straw nitrogen content (N) 0.59-1.26 (%), *in vitro* organic matter digestibility (IVOMD) 38.6-44.8 (%) and metabolizable energy (ME) 5.7-7.1 (MJ/kg) were recorded in the different varieties. The effects of variety, year and their interactions on GY, SY, straw N, IVOMD and ME of 31 rice varieties were significant. Broad sense heritabilities ( $H^2$ ) were higher for GY (0.96) than for SY (0.72).  $H^2$  for Straw

N was 0.65, IVOMD had a low  $H^2$  of 0.28 and ME ( $H^2 = 0.53$ ) was moderate. he results indicate that improved straw fodder traits will also increase the likelihood of adoption of new rice varieties with better grain yields, for example, out of the 31 varieties, Difalu with SY, 8.9 (t/ha) and Chakrasali with SY, 8.6 (t/ha), both have good IVOMD (45%) without a significant penalty on the GY (approximately 5.4 t/ha). The potential impact of improved dual-purpose rice varieties is, therefore, enormous. However, genotypic variation in straw quality should not be exploited at the expense of grain yield. In this study, no significant correlation was found between straw quality and GY (Fig. 1). There were two varieties that have both good straw quality and grain yield.

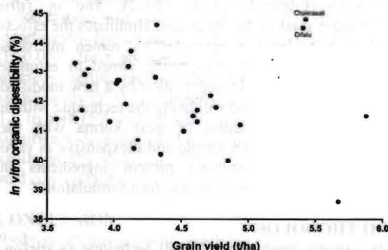


Fig. 1. Relations between grain yield and straw quality of 31 rice varieties across two years

## CONCLUSION

The analysis of 31 varieties (two-year's data) showed that two varieties (Chakrasali and Difalu) are the most promising as they have both superior straw quality and reasonably good grain, this work helps rice breeders for genetic enhancement in multidimensional crop improvement.

## REFERENCES

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