

## Growth, yield attributes and yield of rice as influenced by paddy residue and nitrogen management options under rice-rice cropping systems.

### ABSTRACT (143 words / 300 words)

A field experiment was conducted during 2021-22 and 2022-23 at Regional Agricultural Research Station, Arepally, Warangal district. It is situated in the Central Telangana Zone. A total of 18 treatments replicated thrice in factorial RBD design. The study is conducted to know the impact of paddy residue and nitrogen management options on growth, yield attributes and yield of rice. The results of the experiment revealed that there is no significant effect on plant height, number of tillers per hill and panicle length. Productive tillers per hill, Number of grains per panicle, 1000 seed weight (gms) significantly effected by both the factors and there is no significant interaction between the two factors. Grain yield, straw yield was significantly effected by both paddy straw and nitrogen management options under rice-rice cropping systems.

**Keywords:** Grain yield, straw yield, plant height, panicle length, 1000 seed weight.

**Introduction:** India is the second largest producer of Rice after China. The area, production and productivity of Rice in India about 44.79 M ha, 112.41 million tones and 2578 kg ha<sup>-1</sup> respectively. In India, major rice growing states are West Bengal, Punjab, Uttar Pradesh, Tamil Nadu, Andhra Pradesh, Telangana, Bihar, Odisha etc. The area and production of rice in Telangana is 2 million hectares and 6.6 million tons respectively. The area under rice cultivation in the state has increased to 2.7 Mha (2019-20) as against 1.9 Mha in 2013-14 and also production increased in leaps and bounds from 5.7 mt in 2013-14 to 9.8 mt in 2019-20 (Directorate of Economics and Statistics, Government of India, Socio Economic Outlook, 2020).

Rice is the most residue producing crop in Asia (826 million tons) contributing 84% of total production of the world. Traditionally, rice straw is removed from fields for use as cattle feed and other purposes in South Asia. On average, rice crop residues contain 0.7% N, 0.23% P and 1.75% K. Therefore, the amount of NPK contained in rice crop residues produced is about  $22.13 \times 10^6$  and  $26.26 \times 10^6$  year<sup>-1</sup> in Asia and the world, respectively (Goswami et al., 2019). From the farmers' point of view, burning may be seen as the most suitable method of disposing of rice straw. It is not only a cost-effective method but it acts as an effective

**Comment [AEFH1]:**  
(3846 words / 3000- 6000 words).

Type of papers

1. Original research papers:  
Papers that include original empirical data that have not been published anywhere earlier (except as an abstract). Null/negative findings and replication/refutation findings are also welcome. This type of paper normally should not exceed 25 double-spaced pages of text (including references) and should not contain more than 15 figures/tables. We advise a length of 3000-6000 words (including everything).

**Comment [AEFH2]:** 143 words / 300 words)

Abstract

The abstract should be concise and informative. It should not exceed 300 words in length. It should briefly describe the purpose of the work, techniques and methods used, major findings with important data and conclusions. Different sub-sections, as given below, should be used. No references should be cited in this part. Generally non-standard abbreviations should not be used, if necessary they should be clearly defined in the abstract, at first use.

SAMPLE ABSTRACT:

Aims: Here clearly write the aims of this study.  
Sample: To correlate platelet count, splenic index (SI), platelet count/splenic diameter ratio and portal-systemic venous collaterals with the presence of esophageal varices in advanced liver disease to validate other screening parameters.  
Study design: Mention the design of the study here.

Place and Duration of Study: Sample: Department of Medicine (Medical Unit IV) and Department of Radiology, Services Institute of Medical Sciences (SIMS), Services Hospital Lahore, between June 2009 and July 2010.  
Methodology: Please write main points of the research methodology applied. Sample: We included 63 patients (40 men, 23 women; age range 18-75 years) with liver cirrhosis and portal hypertension, with or without the medical history of gastrointestinal bleeding. Clinical as well as hematological examination (platelet count) and ultrasonography (gray as well as color Doppler scale including splenic index and splenorenal/ pancreaticoduodenal collaterals) was done besides upper GI ..

**Comment [AEFH3]:** Conclusions ?????

**Comment [AEFH4]:** Introduction  
Provide a factual background, clearly defined problem, proposed solution, a brief literature survey and the scope and justification of the work done.

pest

control procedure (Adam John, 2013). Burning of crop stubble causes the air pollution and lead to loss of huge biomass, inorganic carbon, plant nutrients, the

#### Reference style

References must be listed at the end of the manuscript and numbered in the order that they appear in the text. Every reference referred in the text must also present in the reference list and vice versa. In the text, citations should be indicated by the reference number in brackets [3].

entire amount of C, approximately 80–90% N, 25% of P, 20% of K and 50% of S present in crop residues are lost in the form of various gaseous and particulate matters, resulting in atmospheric pollution and global warming (Kaur *et al.*, 2019). Incorporation in the soil poses challenges in intensive systems with two to three cropping rounds per year. This is due to the insufficient time for decomposition, leaving the straw with poor fertilization properties for the soil and hindering crop establishment. As a result, open-field burning of straw has increased dramatically over the last decade, despite being banned in most rice-growing countries because of pollution and the associated health issues. Therefore, it is important to look for sustainable solutions and technologies that can reduce the environmental footprint and add value by increasing the revenues of rice production systems (Hung *et al.*, 2020).

#### Materials and Methods:

##### Location and date of research. SUGGESTION

A field experiment was conducted during 2021-22 and 2022-23 at Regional Agricultural Research Station, Arepally, Warangal district. It is situated in the Central Telangana Zone. The experiment was conducted in Factorial randomized block design. The soil was sandy clay loam in texture. The variety chosen for rice is KNM-118 spacing adopted for rice 20 X 15 cm, plot size of 5 X 4 = 20 Sq. Meters.

##### Treatmental details:

Factor 1 (paddy straw management options) Factor 2 (fertilizer N levels). Among paddy straw management options it has burning (one week before land preparation), incorporation (a week before land preparation consortium is sprayed, week after its spray paddy straw will be incorporated), Cutting and removal of straw (one week before land preparation paddy straw removed and consortium will be sprayed, week after spray paddy straw is incorporated).

Among fertilizer N levels T<sub>1</sub> 100 % RDN (33.3% during transplanting, 33.3% maximum tillering stage (30 DAT) and 33.3 % panicle initiation stage (60 DAT), T<sub>2</sub> 100% RDN

**Comment [AEFH5]:** HERE YOU MUST INCLUDE THE OBJECTIVE OR JUSTIFICATION OF THE RESEARCH

(40% during transplanting, 30% maximum tillering stage (30 DAT), 30% panicle initiation stage (60 DAT), T<sub>3</sub> 100% RDN (10% during transplanting, 30% 15 days after transplanting, 30% maximum tillering stage (30 DAT) and 30% panicle initiation stage (60 DAT), T<sub>4</sub> 100% RDN (15% during transplanting, 30% 15 days after transplanting, 30% maximum tillering stage (30DAT) and 25% panicle initiation stage (60 DAT), T<sub>5</sub> 115% RDN (18 % during transplanting, 36% 15 days after transplanting, 36% maximum tillering stage (30 DAT) and 25% panicle initiation stage (60 DAT), T<sub>6</sub> 130% RDN (20% during transplanting, 42% 15 days after transplanting, 42% maximum tillering (30 DAT) stage and 26% panicle initiation stage (60 DAT). □

#### **Microbial consortium:** SUGGESTION

**Consists of decomposers** belonging to genera *Phanerochaeta*, *Asperigillus*, *Trichoderma*. RDF for *Rabi rice* - 120-60-40 kg N-P-K kg ha<sup>-1</sup>. Recommended doses of phosphorus, potassium and FYM (10 t ha<sup>-1</sup>) will be applied in equal quantities in all treatments. Five randomly selected plants from each plot were taken and measured for plant height (cm), number of tillers hill<sup>-1</sup>, number of effective tillers per hill, number of grains per panicle, panicle length, test weight and average values were calculated.

#### **Grain yield**

Plants in the net plot area were harvested and threshed separately. Grains were dried under sun and grain yield adjusted to 12 per cent moisture. Grain yield per plot was recorded after cleaning. From this yield per plot, grain yield per hectare was computed and expressed as kg ha<sup>-1</sup>.

#### **Straw yield**

After threshing the grain, the remaining straw was dried under sun and yield per plot was recorded and the yield per hectare was computed and expressed in kg ha<sup>-1</sup>.

#### **Results and discussion:**

##### **Tables & Figures**

**Tables & figures should be placed inside the text.**

**Tables and figures should be presented as per their appearance in the text.**

**It is suggested that the discussion about the tables and figures should appear in the text before the appearance of the respective tables and figures.**

**No tables or figures should be given without discussion or reference inside the text.**

**ALL TABLES IN THIS MANUSCRIPT HAVE NO REFERENCE IN THE TEXT AND WERE PLACED AT THE END OF THE MANUSCRIPT AT THE LIST OF**

## **REFERENCES AND THIS IS WRONG ACCORDING TO JOURNAL GUIDELINES.**

### **Growth parameters**

#### **Plant height (cm)**

There is no significant effect of paddy straw and nitrogen management options on plant height and there is no interaction between two factors.

The highest plant height was observed in burning 43.34 cm at 30 DAT followed by cutting and removal 41.96 cm and least was reported in incorporation 40.68 cm.

With the factor 2 the highest was obtained in T<sub>2</sub> 43.56 cm followed by T<sub>1</sub> 42.92 cm and least was obtained in T<sub>3</sub> 40.29 cm.

At 60, 90 DAT highest was reported in incorporation 76.51 cm and 101.20 and least was observed in cutting and removal 72.14 cm and 95.62 cm.

With factor 2 highest was obtained in T<sub>6</sub> 79.53 cm, 104.29 cm followed by T<sub>5</sub> 77.49 cm, 102.22 cm and least was reported in T<sub>1</sub> at 60, 90 DAT respectively.

#### **Number of tillers hill<sup>-1</sup>**

The highest number of tillers per hill<sup>-1</sup> was obtained in burning 11.36 least was observed in 10.86 incorporation at 30 DAT.

With factor 2 highest was reported in T<sub>2</sub> 11.64 followed by 11.45 T<sub>1</sub> and least was reported in T<sub>3</sub>.

At 60, 90 DAT highest was obtained in incorporation 12.51, 15.04 and least was reported in cutting and removal 11.94, 13.22.

With factor 2 highest was observed in T<sub>6</sub> 13.24, 15.20 followed by T<sub>5</sub> 12.83, 14.93 and least was observed in T<sub>1</sub> in 60, 90 DAT. There is no significant effect of paddy straw and nitrogen management options on number of tillers hill<sup>-1</sup> and there is no interaction between two factors.

At harvest from the pooled data of two years the highest number of tillers per hill was obtained in 20.26 incorporation followed by burning 19.25 and cutting and removal 18.19 and there is significant effect of paddy straw on number of tillers per hill at harvest. Among the different levels of nitrogen the highest was obtained in T<sub>6</sub> 21.74 which was on par with T<sub>5</sub> 20.59 and the least was obtained in T<sub>1</sub> 16.96 and there is significant effect on number of tillers per hill. There is no significant interaction between the two factors.

### **Yield attributes in rice**

#### **Panicle length**

With the paddy straw and nitrogen management options there is no significant effect on panicle length (cm) and there is no significant interaction between the two factors.

At harvest the highest panicle length was observed in 22.06 (cm) incorporation followed by burning 21.25 (cm) and cutting and removal 20.50 (cm).

T<sub>6</sub> recorded the highest with different nitrogen dose at 22.44 cm, whereas T<sub>1</sub> reported the lowest at 20.25 cm.

#### **Productive tillers per hill**

With the paddy straw and nitrogen management options there is significant effect on Productive tillers per hill and there is no significant interaction between the two factors.

The highest was obtained in incorporation 15.39 followed by burning 14.27 and cutting and removal 13.15 among the paddy straw management options

With different levels of Nitrogen application the highest was obtained in T<sub>6</sub> 16.76 which was on par with T<sub>5</sub> 15.91 and the least was obtained in T<sub>1</sub> 11.91.

#### **1000 seed weight (gms)**

Both paddy straw and nitrogen management significantly affected the 1000 seed weight (gms) and there is no significant interaction between the two factors.

At harvest highest 1000 seed weight gms was obtained in 23.72 gms incorporation which was on par with burning 22.78 gms and the least was obtained in cutting and removal 21.35 gms.

Among the nitrogen levels highest was obtained in T<sub>6</sub> 23.84 gms which statistically on par with T<sub>5</sub> 23.28 gms T<sub>4</sub> 22.92 gms and T<sub>3</sub> 22.39 gms and the least was observed in T<sub>1</sub> 21.47 gms.

#### **Number of grains per panicle**

With the factor 1 highest was observed in incorporation 91.73 which was on par with burning 89.11 and least was observed in cutting and removal 85.65.

Among the nitrogen management options highest was observed in T<sub>6</sub> 93.97 and it is on par with T<sub>5</sub> 91.97, T<sub>4</sub> 89.62, T<sub>3</sub> 88.07 and least was reported in T<sub>1</sub> 83.15.

(Banjara *et al.*, 2019) reported that plant height, number of tillers, dry matter accumulation, number of leaves hill<sup>-1</sup> and LAI was recorded significantly higher under treatment incorporation of rice straw as compared to burning and normal transplanting. The lowest yield attributes was obtained in T<sub>1</sub> and T<sub>2</sub> this is because of due to the fact that major share of N were applied during the early growth stages, produced lower grain yield. This may be attributed to the failure to synchronize the N supply as per demand of the crop at all the major system of crop growth crucial for higher yields (Chaudhary *et al.*, 2013). Delayed application of N might be helpful in keeping the plant greener for long

and thereby facilitating the higher production and translocation of photosynthetic products towards economic parts (Dar *et al.*, 2000). Significant difference was observed with application of different nitrogen levels in grain yield and yield attributing characters *viz*; tillers m<sup>-2</sup>, panicle length, number of filled grains per panicle and thousands grain weight (Khatri *et al.*, 2019).

#### **Grain and straw yield (kg ha<sup>-1</sup>)**

Under paddy straw management options, of pooled years the highest grain yield and straw yield was obtained in incorporation plots 7702.94 kg ha<sup>-1</sup>, 9780.65 kg ha<sup>-1</sup> followed by burning 7163.11 kg ha<sup>-1</sup>, 9182.87 kg ha<sup>-1</sup> and cutting and removal 6621.66 kg ha<sup>-1</sup>, 8535.29 kg ha<sup>-1</sup>.

Among the Nitrogen levels and time of application the highest grain and straw yield was obtained in T<sub>6</sub> 7955.36 kg ha<sup>-1</sup>, 10056.46 kg ha<sup>-1</sup> which was on par with T<sub>5</sub> and the least was obtained in T<sub>1</sub>. Grain and straw yield was found in the order 130% RDN T<sub>6</sub> > 115% RDN T<sub>5</sub> > 100% RDN T<sub>4</sub> > 100% RDN T<sub>3</sub> > 100% RDN T<sub>2</sub> and 100% RDN T<sub>1</sub> with the yield.

The increase in yield with straw incorporation is due to returning of large part of nutrients back into soil that can be observed by the plant (Bakht *et al.*, 2009) and straw adds organic matter to the soil (Huang *et al.*, 2021) which improves soil physical, chemical, biological properties results in improved soil health which contributes to increased grain yield (Zhang *et al.*, 2016; Wang *et al.*, 2015). Paddy straw with wide C:N ratio showed higher nitrogen immobilization during its initial stage of decomposition, which was later released and potentially improved the available mineral nitrogen during subsequent rice growth stages thereby enhancing growth and yield (Xu *et al.*, 2010). It seems to be possible that burning of paddy straw led to loss of soil nutrients and hence a possible decrease in soil fertility (Dobermann and Fairhurst, 2002), could be the reason for the lowest yields in burning treatment. Zhang *et al.*, 2010 reported 7.5% yield increases in wheat crop grown with combination of fertilizer-N and crop residue return to soil. It has been ascribed to the fact that the straw returned to soils leads to large decrease in fertilizer-N losses (Grageda-Cabrera *et al.*, 2011). With the increase of nitrogen fertilization grain yield increased. Similar significant results were reported by Sharma *et al.* (2021), Khatri *et al.* (2019) Singh and Sharma (2020) and Tian *et al.* (2018) that grain yield was increased with increasing nitrogen levels.

Fageria (2014) stated that higher nitrogen helps in the metabolism of protein and ultimately the metabolism of carbohydrate in the latter stages of growth which might be

the cause for significantly higher production of total above ground biomass and ultimately higher production of straw.

#### Conclusions:

From the results of the present study it can be concluded that Paddy straw incorporation along with additional supply of Nitrogen *i.e* 130% RDN, 115% RDN produced higher grain yield, straw yield and other growth and yield attributes in rice-rice cropping system. Thus, farmers are suggested to incorporate crop residues with nitrogen dose of 130% RDN or 115 % RDN into the soil instead of burning; which is environmentally hazardous to human and soil health.

#### References:

##### Reference to a journal:

##### For Published paper:

1. Hilly M, Adams ML, Nelson SC. A study of digit fusion in the mouse embryo. *Clin Exp Allergy*. 2002;32(4):489-98.

Note: List the first six authors followed by et al.

Note: Use of DOI number for the full-text article is encouraged. (if available).

Note: Authors are also encouraged to add other database's unique identifier (like PUBMED ID).

- 1- Directorate of Economics and Statistics, Govt. of India; Socio-Economic Outlook 2020, Govt of Telangana.
- 2- Goswami, S.B., Mondal, R and Kumar, M.S. 2019. Crop Residue Management Options in Rice-Rice System: A Review. *Archives of Agronomy and Soil Science*. 66(9): 1218–1234.
- 3- Adam John. 2013. Alternatives to open-field burning on paddy farms, Agricultural and Food Policy Studies Institute, Malaysia. 18:1-5.
- 4- Kaur, K., Kaur, P and Sharma, S. 2019. food security, Nutrition and Sustainable Agriculture - emerging Technologies. 618-620.
- 5- Hung, N.V., Concepcion, M.M., Migo, M.V., Quilloy, R., Balingbing, C., Chivenge, P and Gummert, M. 2020. Rice Straw Overview: Availability, Properties, and Management Practices. *Sustainable Rice Straw Management*. 1-13.
- 6- Khatri, N., Rawal, N., Chalise, D., Bista, M., and Pandey, B.P. 2020. Effect of Crop Residue and Nitrogen Level in Yield and Yield Attributing Traits of Rice under Rice-Wheat Cropping System. *International Journal of Advanced Biological and Biomedical Research*. 8(2): 146-152.
- 7- Bakht, J., Shafi, M., Jan, M.T and Shah, Z. 2009. Influence of crop residue management, cropping system and N fertilizer on soil N and C dynamics and sustainable wheat (*Triticum aestivum* L.) production. *Soil and Tillage Research*. 104(2): 233–240.

##### Comment [AEFH6]: 7 AUTHORS

Nguyen, V Hung & Detras, Monet Concepcion & Migo, Maria & Quilloy, Rei & Balingbing, Carlito & Chivenge, Pauline & Gummert, Martin (2020). Rice Straw Overview: Availability, Properties, and Management Practices. 10.1007/978-3-030-32373-8\_1. [https://www.researchgate.net/publication/337605837\\_Rice\\_Straw\\_Overview\\_Availability\\_Properties\\_and\\_Management\\_Practices](https://www.researchgate.net/publication/337605837_Rice_Straw_Overview_Availability_Properties_and_Management_Practices)

- 8- Huang, W., Wu, J.F., Pan, X.H., Tan, X.M., Zeng, Y.J., Shi, Q.H., Liu, T.J and Zeng, Y.H. 2021. Effects of long-term straw return on soil organic carbon fractions and enzyme activities in a double-cropped rice paddy in South China. *Journal of Integrative Agriculture*. 20(1): 236-247.
- 9- Zhang, P., Chen, X., Wei, T., Yang, Z., Jia, Z., Yang, B., Han, Q and Ren, X. 2016. Effects of straw incorporation on the soil nutrient contents, enzyme activities, and crop yield in a semiarid region of China. *Soil and Tillage Research*. 160: 65-72.
- 10- Wang, W., Lai, D.Y.F., Wang, C., Pan, T and Zeng, C. 2015. Effects of rice straw incorporation on active soil organic carbon pools in a subtropical paddy field. *Soil and Tillage Research*. 152: 8-16.
- 11- Xu, Y., Nie, L., Buresh, R.J., Huang, J., Cui, K., Xu, B., Gong, W and Peng, S. 2010. Agronomic performance of late-season rice under different tillage, straw, and nitrogen management. *Field Crops Research*. 115(1): 79-84.
- 12- Zhang, J., Wen, X, X and Liao, Y. 2010. Effects of different amounts of maize straw returning on soil fertility and yield of wheat winter. *Plant Nutrition Fertilizer Science*. 16(3): 612-619.
- 13- Behera, U.K., Singh, G., Kumar, A and Sharma, A.R. 2021. Long-term Effects of Tillage, Crop Residue and Crop Rotations on Soil Microbial Parameters under the Wheat (*Triticum aestivum*) Based Cropping Systems in Semi-Arid Northern India. *Indian Journal of Pure Applied Bioscience*. 9(1), 219-235.
- 14- Singh, S and Sharma, S. 2020. Temporal changes in rhizosphere biological soil quality indicators of wheat in response to nitrogen and straw incorporation. *Tropical Ecology*. 61(3): 328-344.
- 15- Tian, Z., Ge, Y., Zhu, Q., Yu, J., Zhou, Q., Cai, J., Jiang, D., Cao, W and Dai, T. 2018. Soil nitrogen balance and nitrogen utilization of winter wheat affected by straw management and nitrogen application in the Yangtze river basin of China. *Archives of Agronomy and Soil Science*. 65(1): 1-15.
- 16- Fageria, N.K. 2014. Nitrogen management in crop production. CRC press, 24-25.
- 17- Banjara, G.P., Chandrakar, D.K and Tigga, B. 2019. Performance of Rice Straw Management and Nitrogen Scheduling on Yield and Growth Parameters of Summer Rice in Chhattisgarh Plain. *Int.J.Curr.Microbiol.App.Sci*. 8(10): 1079-1083
- 18- Grageda-Cabrera, O.A., Vera-Núñez, J.A., Aguilar-Acuña, J.L., Macías-Rodríguez, L., Aguado-Santacruz, G.A and Peña-Cabriales, J.J, 2011. Fertilizer dynamics in different tillage and crop rotation systems in a Vertisol in Central Mexico. *Nutrient Cycling in Agroecosystems*. 89(1): 125-134.
- 19- Dobermann, A and Fairhurst, T. 2002. Rice straw management. *Better Crops International*. 16: 7- 11.
- 20- Dar, S.A., Bali, A.S. and Shah, M.H. 2000. Effect of different levels and time of nitrogen application on wet-seeded rice in Kashmir Valley. *Oryza* 37(3):244- 246.
- 21- Chaudhary SK, Singh Y, Pandey DN, Dharmindar. Nitrogen scheduling, phosphorus management and green maturing for increasing productivity of low land rice. *Oryza*. 2013; 50(3):253-258.

Comment [AEFH7]: 8 AUTHORS

Comment [AEFH8]: 8 AUTHORS

Comment [AEFH9]: 8 AUTHORS

Comment [AEFH10]: 9 AUTHORS

Comment [AEFH11]:

Nand Kumar Fageria: Nitrogen Management in Crop Production; CRC Press, 25 de jun. de 2014 - 436 páginas. ISBN 1482222833, 9781482222838.

[https://books.google.com.br/books?id=wubM-AwAAQBAJ&hl=pt-BR&source=gbs\\_navlinks\\_s](https://books.google.com.br/books?id=wubM-AwAAQBAJ&hl=pt-BR&source=gbs_navlinks_s)

**Table 1: Effect of paddy straw and nitrogen management on plant height (cm) at different stages in rice-rice cropping system**

	30 DAT			60 DAT			90 DAT		
Treatments	2021-22	2022-23	pooled data	2021-22	2022-23	pooled data	2021-22	2022-23	pooled data
<b>Burning</b>	44.29	42.39	43.34	74.91	73.37	74.14	99.61	98.07	98.84
<b>Incorporation</b>	41.84	39.52	40.68	77.81	75.21	76.51	101.94	100.46	101.20
<b>Cutting and removal</b>	43.28	40.64	41.96	73.40	70.87	72.14	96.27	94.97	95.62
<b>SE(m)±</b>	0.83	0.84	0.82	1.76	1.87	1.79	3.14	3.17	3.15
<b>CD</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Nitrogen levels and time of application</b>									
<b>T1</b>	44.01	41.82	42.92	70.61	67.76	69.18	93.93	91.96	92.95
<b>T2</b>	44.63	42.48	43.56	71.92	69.63	70.78	95.53	95.78	95.65
<b>T3</b>	41.59	38.98	40.29	74.93	72.32	73.63	98.10	96.47	97.29
<b>T4</b>	42.27	39.84	41.06	76.10	73.87	74.98	99.86	98.00	98.93
<b>T5</b>	42.78	40.66	41.72	78.02	76.95	77.49	103.05	101.39	102.22
<b>T6</b>	43.52	41.33	42.43	80.68	78.38	79.53	105.16	103.41	104.29
<b>SE(m)±</b>	1.17	1.19	1.16	2.49	2.65	2.53	4.44	4.49	4.45
<b>CD</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS
T1:100 % RDN (33.3% during transplanting, 33.3% maximum tillering stage and 33.3 % panicle initiation stage T2:100% RDN (40% during transplanting, 30% maximum tillering stage, 30% panicle initiation stage T3:100% RDN (10% during transplanting, 30% 15 days after transplanting, 30% maximum tillering stage and 30% panicle initiation stage T4:100% RDN (15% during transplanting, 30% 15 days after transplanting, 30% maximum tillering stage and 25% panicle initiation stage T5:115% RDN (18 % during transplanting, 36% 15 days after transplanting, 36% maximum tillering stage and 25% panicle initiation stage T6:130% RDN (20% during transplanting, 42% 15 days after transplanting, 42% maximum tillering stage and 26% panicle initiation stage									



**Table 3 : Yield attributes of rice as influenced by different paddy straw management options and fertilizer N levels.**

Treatments	Panicle length (cm)			Productive tillers per hill			Number of grains per panicle			1000 seed weight (gms)		
	2021-22	2022-23	Pooled data	2021-22	2022-23	pooled data	2021-22	2022-23	Pooled data	2021-22	2022-23	pooled data
<b>Burning</b>	21.06	21.45	21.25	13.77	14.78	14.27	90.15	88.06	89.11	22.60	22.97	22.78
<b>Incorporation</b>	21.86	22.27	22.06	14.94	15.84	15.39	93.05	90.040	91.73	23.51	23.93	23.72
<b>Cutting and removal</b>	20.32	20.69	20.50	12.58	13.73	13.15	86.98	84.31	85.65	21.16	21.53	21.35
<b>SE(m)±</b>	0.51	0.50	0.50	0.36	0.55	0.38	1.67	1.66	1.66	0.40	0.40	0.40
<b>CD</b>	NS	NS	NS	1.04	1.59	1.08	4.81	4.76	4.77	1.15	1.16	1.15
<b>Nitrogen levels and time of application</b>												
<b>T1</b>	20.05	20.45	20.25	11.38	12.44	11.91	84.33	81.97	83.15	21.28	21.66	21.47
<b>T2</b>	20.42	20.83	20.62	12.46	13.44	12.95	87.42	84.93	86.18	21.60	22.01	21.81
<b>T3</b>	20.83	21.17	21.00	13.03	13.89	13.46	89.08	87.06	88.07	22.22	22.56	22.39
<b>T4</b>	21.23	21.64	21.43	14.24	15.06	14.65	90.75	88.50	89.62	22.71	23.12	22.92
<b>T5</b>	21.71	22.08	21.90	15.40	16.42	15.91	93.35	90.59	91.97	23.09	23.46	23.28
<b>T6</b>	22.24	22.64	22.44	16.07	17.44	16.76	95.44	92.50	93.97	23.64	24.04	23.84
<b>SE(m)±</b>	0.72	0.71	0.71	0.51	0.78	0.53	2.37	2.34	2.35	0.57	0.57	0.57
<b>CD</b>	NS	NS	NS	1.47	2.25	1.52	6.80	6.73	6.75	1.63	1.63	1.63

**Table 4 : Grain yield and straw yield (kg ha<sup>-1</sup>) of rice as influenced by paddy straw management options and fertilizer N levels**

Treatments	Grain Yield			Straw Yield		
	2021-22	2022-23	pooled data	2021-22	2022-23	pooled data
<b>Burning</b>	7081.0	7245.2	7163.1	9082.3	9283.3	9182.8
<b>Incorporation</b>	7630.9	7774.9	7702.9	9687.3	9873.9	9780.6
<b>Cutting and removal</b>	6524.4	6718.9	6621.6	8414.4	8656.1	8535.2
<b>SE(m)±</b>	185.79	177.7	140.84	235.04	243.64	190.54
<b>CD</b>	533.96	510.73	404.77	675.50	700.22	547.63
<b>Nitrogen levels and time of application</b>						
<b>T1</b>	6596.2	6766.5	6681.4	8685.8	8926.4	8806.1
<b>T2</b>	6353.4	6520.3	6436.8	8321.9	8530.0	8425.9
<b>T3</b>	7068.4	7235.5	7151.9	8968.9	9170.5	9069.7
<b>T4</b>	6978.9	7146.2	7062.5	8788.5	9007.7	8898.1
<b>T5</b>	7603.4	7770.9	7687.2	9645.3	9836.7	9741.0
<b>T6</b>	7872.1	8038.5	7955.3	9957.6	10155.2	10056.4
<b>SE(m)±</b>	262.74	251.31	199.17	332.39	344.55	269.47
<b>CD</b>	755.13	722.28	572.43	955.31	990.26	774.46