Data Article

Data on effect of variety, seedling transplanting age and nitrogen fertilizer rates on growth performance of rice in Southern Guinea Savannah, Nigeria

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ABSTRACT

The age of rice seedling at transplanting and application of nitrogen fertilizer are important husbandry practices for improved rice growth. The data showed the effect of variety, seedling transplanting age and nitrogen fertilizer rates on the growth of rice. Agronomic field trial was conducted during 2015 and 2016 planting seasons at National Cereals Research Institute Farms of Edozhigi and Badeggi located in the Southern Guinea Savannah of Nigeria. To assessed the effect of variety, seedling transplanting age and nitrogen fertilizer rates on the growth of rice. Treatments were laid out as split–split plot arrangement fitted into Randomized Complete Block Design (RCBD) with three replications. The main plot consisted of two rice varieties (FARO 44 and FARO 52), four seedling transplanting ages (7, 14, 21 and 28 days after planting) and five inorganic N fertilizer rates (0, 60, 120, 180 and 240 kg N/ha) constituted the sub-plot and sub-sub plot respectively. Growth data viz plant height, number of tillers and leaf area index were measured at 30 and 45 days after transplanting (DAT) during the two planting seasons. Plant height was taken from five randomly selected and tagged plants from ground surface to the tip of the leaf or panicle of the main stem using measuring tape. The number of tillers per plant was counted from five randomly selected and tagged hills

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in each plot from two middle rows. The leaf area (cm²) of the leaves was obtained from five randomly selected tagged plants by measuring the leaf length from the base to the tip with a ruler also the widest part of the leaf. The leaf area (LA) was estimated using the equation: 

$$LA = \text{length} \times \text{breath} \times 0.75 \ [1].$$

The leaf area value obtained was used to calculate the leaf area index (LAI), which describes the efficiency of the photosynthetic process on the photosynthetic surface and calculated as the total leaf area/ground area. Data collected were subjected to one way analysis of variance (ANOVA) using GenSTAT 11th edition and the difference between treatments mean tested using least significant difference (LSD) at 5% probability level. The data are of value to agronomists in search of reference. It has the potential to be used to predict seedling age of rice at transplanting and the appropriate nitrogen fertilizer rate for rice growth.

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**Specifications Table**

| Subject          | Agronomy          |
|------------------|-------------------|
| Specific subject area | The data provides baseline information on crop production, crop nutrition and soil fertility |
| Type of data     | Table             |
| How data were acquired | The data were acquired through field work. Plant height was measured from the base of the plant to the tip of the tagged stands using meter rule. The number of tillers was counted from tagged stands and recorded. The leaf area (LA) was calculated using the equation: $LA = \text{length} \times \text{breath} \times 0.75$ [1] from the tagged stands |
| Data format      | Raw               |
| Parameters for data collection | Plant height at 30 and 45 days after transplanting, number of tillers per stand at 30 and 45 days after transplanting, and leaf area index at 30 and 45 days after transplanting |
| Description of data collection | Growth data were measured at 30 and 45 days after transplanting (DAT). Plant height was taken from the base of the plants from ground surface to the tip of the leaf or panicle of the main stem using measuring tape. The number of tillers per plant was counted from five randomly selected and tagged hills in each plot from two middle rows. The leaf area (cm²) of the leaves was obtained from five randomly selected tagged plants by measuring the leaf length from the base to the tip with a ruler also the widest part of the leaf. The leaf area (LA) was estimated using the equation: $LA = \text{length} \times \text{breath} \times 0.75$ [1] |
| Data source location | Institution: National Cereal Research Institute Badeggi, Nigeria |
|                   | Country: Nigeria |
|                   | City/Town/Region: Badeggi |
|                   | Latitude and longitude: Edozhigi (9° 05' N; 5° 57' E) [2] and Badeggi (9° 45' N; 6° 07' E) [3] |
| Data accessibility | Nda, Simon (2021), “Article”, Mendeley Data, V2, https://doi.org/10.17632/bpnpc5vyjv.2 |
|                   | https://data.mendeley.com/datasets/bpnpc5vyjv/ |
Value of the Data

• Soil nutrient depletion and inappropriate nitrogen fertilizer use has been responsible for the low growth of rice in Nigeria. Hence, the present data are important as it revealed the effect of variety, seedling transplanting age and nitrogen fertilizer rates on rice growth.
• These data will be of tremendous benefit to agronomist, crop nutritionist and soil scientists.
• The data could be used as a reference factor to broaden comparable experiment with a purpose to give similar insight to the effect of variety, nitrogen fertilizer rates and the appropriate age of transplanting rice seedlings.

1. Data Description

1.1. Description of raw data

The supplementary data indicates the raw dataset of plant height, number of tillers and leaf area index at 30 and 45 days after transplanting for 2015 and 2016 planting seasons. (Exel sheet 1).

1.2. Plant height

Plant height was taken from the base of the plants from ground surface to the tip of the leaf or panicle of the main stem using measuring tape at 30 and 45 days after transplanting in 2015 and 2016 planting seasons for the two varieties viz- FARO 52 (variety I) and FARO 44 (variety II). Raw data was collected for the three replications at the two locations viz- Badeggi (site i) and Edozhigi (site ii).

1.3. Number of tillers

The number of tillers per plant was counted from five randomly selected and tagged hills in each plot from two middle rows. The raw data was recorded for the three replications and the two locations viz Badeggi (site i) and Edozhigi (site ii) during 2015 and 2016 planting seasons.

1.4. Leaf area index

The leaf area (cm²) of the leaves was obtained from five randomly selected tagged plants by measuring the leaf length from the base to the tip with a ruler also the widest part of the leaf. The leaf area value obtained was used to calculate the leaf area index (LAI), which describes the efficiency of the photosynthetic process on the photosynthetic surface and calculated as the total leaf area/ground area. Raw data was collected for the two planting seasons 2015 and 2016. The raw data was recorded for the three replications and the two locations.

The effect of treatment factors (location, nitrogen fertilizer rates, seedling transplanting age and variety) on plant height at 30 and 45 days after transplanting in Badeggi and Edozhigi during 2015 and 2016 planting seasons were presented in Table 1.

Table 2 exhibits the influence of each treatment factors on number of tillers at 30 and 45 days after transplanting in Badeggi (site i) and Edozhigi(site ii) during 2015 and 2016 planting seasons.

The effect of treatment factors on leaf area index at 30 and 45 days after transplanting at Badeggi (site i) and Edozhigi (site ii) during 2015 and 2016 planting seasons were presented in Table 3.
Fig. 1a. The main field layout of variety.

Rep 1 = replication 1, Rep 2 = replication 2 and Rep 3 = replication 3
V1 = variety Faro 52
V2 = variety Faro 44

Fig. 1b. The sub-plot field layout of seedling transplanting age and nitrogen fertilizer rates.

ST1 = 7 days old seedling
ST2 = 14 days old seedling
ST3 = 21 days old seedling
ST4 = 28 days old seedling
F1 = 0 kg N/ha
F2 = 60 kg N/ha
F3 = 120 kg N/ha
F4 = 180 kg N/ha
F5 = 240 kg N/ha
Table 1
The effect of location, nitrogen fertilizer rates, seedling transplanting age and variety on rice plant height (cm) during 2015 and 2016 planting seasons.

| Treatment factors    | 2015 | 2016 |
|----------------------|------|------|
|                      | Plant height (cm) 30 DAT | Plant height (cm) 45 DAT | Plant height (cm) 30 DAT | Plant height (cm) 45 DAT |
| Location             | 30 DAT | 45 DAT | 30 DAT | 45 DAT |
| Badeggi              | 41.348*** | 48.39*** | 28.55 | 70.78*** |
| Edozhigi             | 36.98 | 43.26 | 34.44*** | 41.65 |
| SEM                  | 0.544 | 0.738 | 0.330 | 0.413 |
| LSD (0.05)            | 1.52 | 2.06 | 0.92 | 1.15 |
| Nitrogen rate        |       |       |       |       |
| 0 kg/ha              | 38.00 | 44.06 | 30.90 | 55.22 |
| 60 kg/ha             | 38.07 | 44.45 | 31.03 | 55.51 |
| 120 kg/ha            | 40.89 | 48.14 | 31.04 | 56.37 |
| 180 kg/ha            | 39.23 | 45.76 | 31.54 | 55.86 |
| 240 kg/ha            | 39.62 | 46.70 | 32.96* | 58.11* |
| SEM                  | 0.860 | 1.167 | 0.522 | 0.653 |
| LSD (0.05)            | 2.4 | 3.26 | 1.46 | 1.83 |
| Transplanting age    |       |       |       |       |
| 7 days               | 34.91 | 42.02 | 26.65 | 49.52 |
| 14 days              | 36.87 | 42.76 | 29.86 | 54.55 |
| 21 days              | 41.35 | 47.15 | 33.67 | 58.84 |
| 28 days              | 43.51*** | 51.36*** | 35.79*** | 61.95*** |
| SEM                  | 0.769 | 1.044 | 0.467 | 0.584 |
| LSD (0.05)            | 2.15 | 2.92 | 1.30 | 1.63 |
| Variety              |       |       |       |       |
| Faro 52              | 38.19 | 47.53* | 34.70* | 64.61* |
| Faro 44              | 40.14* | 44.11 | 28.29 | 47.82 |
| SEM                  | 0.544 | 0.738 | 0.330 | 0.413 |
| LSD (0.05)            | 1.52 | 2.06 | 0.92 | 1.15 |

DAT = days after transplant; SEM = standard error of means.
LSD = Least significant difference.
* = significant at p < 0.05.
*** = significant at p < 0.001.
Table 2
The effect of location, nitrogen fertilizer rate, seedling transplanting age and variety on rice number of tillers during 2015 and 2016 planting seasons.

| Treatment factors | Number of tillers 30 DAT | Number of tillers 45 DAT | Number of tillers 30 DAT | Number of tillers 45 DAT |
|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| **Location**      |                          |                          |                          |                          |
| Badeggi           | 12.12                    | 14.95                    | 5.62                     | 13.68                    |
| Edozhigi          | 14.97***                 | 17.64***                 | 17.15***                 | 17.88***                 |
| SEM               | 0.276                    | 0.384                    | 0.371                    | 0.265                    |
| LSD (0.05)        | 0.77                     | 1.07                     | 1.04                     | 0.74                     |
| **Nitrogen rates**|                          |                          |                          |                          |
| 0 kg              | 13.62                    | 14.08                    | 9.83                     | 14.17                    |
| 60 kg             | 13.63                    | 15.51                    | 11.31                    | 15.42                    |
| 120 kg            | 14.55*                   | 17.95*                   | 12.16                    | 15.84                    |
| 180 kg            | 13.57                    | 17.48                    | 12.25*                   | 16.69*                   |
| 240 kg            | 12.35                    | 16.46                    | 11.37                    | 16.23                    |
| SEM               | 0.437                    | 0.607                    | 0.587                    | 0.419                    |
| LSD (0.05)        | 1.22                     | 1.70                     | 1.64                     | 1.17                     |
| **Transplanting age** |                    |                          |                          |                          |
| 7 days            | 12.13                    | 15.86                    | 12.00                    | 12.70                    |
| 14 days           | 13.35                    | 15.94                    | 10.02                    | 14.68                    |
| 21 days           | 14.05                    | 17.02                    | 10.96                    | 16.43                    |
| 28 days           | 14.65***                 | 16.37                    | 12.55***                 | 19.29***                 |
| SEM               | 0.390                    | 0.543                    | 0.525                    | 0.375                    |
| LSD (0.05)        | 1.10                     | 1.52                     | 1.47                     | 1.05                     |
| **Variety**       |                          |                          |                          |                          |
| Faro 52           | 14.96*                   | 17.80*                   | 10.75                    | 13.23                    |
| Faro 44           | 12.13                    | 14.79                    | 12.02*                   | 18.32*                   |
| SEM               | 0.276                    | 0.384                    | 0.371                    | 0.265                    |
| LSD (0.05)        | 0.77                     | 1.07                     | 1.04                     | 0.74                     |

DAT = days after transplanting.
SEM = standard error means.
LSD = Least significant difference.
* = significant at p < 0.05.
*** = significant at p < 0.001.
Table 3
The effect of location, nitrogen fertilizer rates, seedling transplanting age and variety on rice leaf area index during 2015 and 2016 planting seasons.

| Treatment factors | 2015 |               | 2016 |               |
|-------------------|------|---------------|------|---------------|
|                   | Leaf area index | Leaf area index | Leaf area index | Leaf area index |
|                   | 30 DAT | 45 DAT | 30 DAT | 45 DAT |
| Location          |        |        |        |        |
| Badeggi           | 3.32   | 4.09   | 2.19   | 4.78   |
| Edozhigi          | 3.44   | 3.98   | 9.50***| 11.31***|
| SEM               | 0.0908 | 0.0972 | 0.501  | 0.265  |
| LSD (0.05)        | 0.25   | 0.27   | 1.40   | 0.74   |
| Nitrogen rates    |        |        |        |        |
| 0 kg              | 3.34   | 3.96   | 5.55   | 8.66   |
| 60 kg             | 3.25   | 4.03   | 5.61   | 6.45   |
| 120 kg            | 3.52   | 4.12   | 6.57   | 6.22   |
| 180 kg            | 3.43   | 3.99   | 5.83   | 9.29   |
| 240 kg            | 3.36   | 4.07   | 5.68   | 9.60***|
| SEM               | 0.1436 | 0.1536 | 0.792  | 0.419  |
| LSD (0.05)        | 0.40   | 0.43   | 2.21   | 1.17   |
| Transplanting age |        |        |        |        |
| 7 days            | 2.69   | 3.50   | 3.72   | 4.79   |
| 14 days           | 3.08   | 3.61   | 4.94   | 6.14   |
| 21 days           | 3.69   | 4.35   | 7.48   | 11.34***|
| 28 days           | 4.06***| 4.68***| 7.52***| 9.90   |
| SEM               | 0.1284 | 0.1374 | 0.708  | 0.375  |
| LSD (0.05)        | 0.36   | 0.38   | 1.99   | 1.05   |
| Variety           |        |        |        |        |
| Faro 52           | 3.80***| 4.69***| 4.70   | 8.94***|
| Faro 44           | 2.96   | 3.38   | 7.00***| 7.15   |
| SEM               | 0.0908 | 0.0972 | 0.501  | 0.265  |
| LSD (0.05)        | 0.25   | 0.27   | 1.40   | 0.74   |

DAT= days after transplanting.
SEM=standard error means.
* = significant at p < 0.05.
LSD = Least significant difference.
*** = significant at p < 0.001.

2. Experimental Design, Materials and Methods

A 2-year agronomic field experiment was planted at two locations Edozhigi (9° 05′ N; 5° 57′ E) [1], and Badeggi (9° 45′ N; 6° 07′ E) [3] under lowland ecology at the National Cereals Research Institute (NCRI) Farms between the month of June to October during 2015 and 2016 planting seasons. The soil at Edozhigi is silt-loam, iron-toxic and classified as dystric gleysol [4]. On the other hand, soils at Badeggi are sandy loam with bulk density of 1.489 g m⁻³ and classified as ultisol (Ayotade and Fagade, 1993). Both sites are located in the Southern Guinea Savannah zone of Nigeria where climate is characterized by a distinct wet season from April to November and dry season from November to March. The relative humidity at dry and raining season ranges between 75–85%. Annual rainfall at the sites ranges between 1,200–1,400 mm and mean temperature of between 23–33 °C.

The experimental design indicated that the experiment had three replications in each location. At each site, it was laid out in a split–split plot arrangement fitted into Randomized Complete Block Design (RCBD) as illustrated in Figs. 1a and 1b.

Treatments consisted of two rice varieties (FARO 52 and FARO 44), four seedling transplanting ages (7, 14, 21 and 28 days after sowing, DAS) and five inorganic N fertilizer rates (0, 60, 120, 180 and 240 kg N/ha). Rice varieties were allocated to the main plot while seedling transplanting age and nitrogen fertilizer rates constituted the sub plot and sub-sub plot, respectively. The size of each main plot was 193.8 m² while the sub plot and sub-sub plot were 34.2 m² and 5.4 m²,
respective. Each sub-sub plot had a dimension of 3 x 1.8 m with alley way of 2.0 m between the main plots, 1.0 m between sub plot, and 1 m between replications. Hence, there were a total of 20 sub-sub plots per replication which gave a total of 60 plots per variety and a total of 120 plots with experimental plot size of 2,184 m² for each site.

Basal application of inorganic P and K fertilizers using single super phosphate (SSP) and mureate of potash (MOP), respectively were both applied at 40 kg/ha. Nitrogen fertilizer (urea 46% N) was split applied to the experimental plots based on each treatment with half of the various inorganic N fertilizer (urea) rates applied together with the P (single super phosphate SSP) and K (mureate of potash) prior to transplanting and manually worked into the soil using hoe while the remaining half was broadcasted at panicle initiation. The flooded field was drained before transplanting. Two rice seedlings were transplanted per hill at a spacing of 20 × 20 cm between and within rows respectively, resulting in a total of 16 rows per plot. The field was flooded after transplanting. Regular weeding was undertaken in the experimental plot using hoe. The experiment was executed for two planting seasons. The data obtained was analysed using GenStat 11th edition (2008). Data were subjected to one way analysis of variance and LSD was used to compare the mean of the data for significant differences at $p < 0.05$.

Ethics Statement

Oryza sativa plants were used in this study. Two varieties of Faro 44 and Faro 52 were involved in the experiment

CRediT Author Statement

Simon Nda: Conceptualization, Methodology, Writing – original draft; Erick Sebetha: Software, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have or could be perceived to have influenced the work reported in this article.

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References

[1] J.M. Chen, T.A. Black, Defining leaf area index for non-flat leaves, Plant. Cell Environ. 15 (1992) 421–429.
[2] M. Bashir, A.S. Gana, A.T. Maji, A.A. Shaibu, E.K. Tsado, Screening for inter-specific Rice Progeny Lines for Africa Rice Gall Midge (AFRGM) Resistance, Am. J. Exp. Agric. 2 (3) (2012) 442–448.
[3] A.K Gana, M.A. Adagba, Reclamation and sustainability of the overmined soybean field at Badeggi, Nigeria, Int. J. Agric. Technol. 9 (4) (2013) 987–997.
[4] L.T. Narteh, K.L. Sahrawat, Influence of flooding on electrochemical and chemical properties of West African soils, Geoderma 87 (1999) 178–2007.