matter ensuring adequate grain-filling and earlier crop maturity. From the obtained results it could be established the superiority of variety Sakha 102 over variety Giza 176 under indentical conditions. In this connection, Suratno et al., (1998) stated that rice varieties and varietal characteristics affecting yield stability. Among these latter are agronomic and morphological characters such as well as pest resistance and tolerance of dough, flooding adverse soils and adverse temperatures.

Results show almost exactly the same trend mentioned in the case of growth parameters, plant height, number .of tillers, roots volume and root dry matter (Table 2-5). This is logical because the dry matter yield is more or less just another expression of the plant growth parameters at least in the case of this experiment. These results are in good agreement with those of Singandhupe and Rajput (1990) who stated that maintenance of 7 cm irrigation head and 1 day drainage, increased grain yield by 11.5% and straw by 8.6% compared with 6 days drainage. Moreover, Woperies et al. (1994) showed that growth and yield of rice were substantially depressed by water stress occurring throughout the whole vegetative phase. However, the authors were primarily interested in the direct effects of water stress rather than water-induced nutritional problems, while Brahmanad et al., (2000), Rao et al., (2000) and Siam et al., (2014) stated that grain and straw yields were significantly improved due to continuous submergence as compared to the soil at field capacity, and the growth reductions were attributed to reduced shoot P levels resulting from the decline in P availability during the loss of soil-water saturation. They concluded that continuous flooding gave a higher grain yield and higher values of yield components and grain quality than intermittent flooding.

**Effect of Fertilizer Treatments**

Data presented in tables (2-5) indicate that irrespective of soil moisture regimes all the fertilizer treatments. Significantly increased rice growth parameters and rice straw and grain yield as they compared with the control treatment ($F_0$). These results agree well with those obtained by Pande et al. (1993) who found that all of the fertilizer treatments gave significantly higher grain and straw yield over the control (treatment).

**Table 6:** Dry matter of straw of rice plants (gm / pot) as affected by different levels of fertilizers, duration of irrigation and varieties

| Fertilizer Treatments | 1st variety (Giza 176) | | | Mean of fertilizer | 2nd variety (Sakha 102) | | | Mean of fertilizer |
|---|---|---|---|---|---|---|---|---|
| | Soil moisture regimes | | | | Soil moisture regimes | | | |
| | $M_1$ | $M_2$ | $M_3$ | | $M_1$ | $M_2$ | $M_3$ | |
| $F_0$ | 58.00 | 52.00 | 43.00 | 51.00 | 61.20 | 55.18 | 44.00 | 53.46 |
| $F_1$ | 69.10 | 65.15 | 58.10 | 64.12 | 72.00 | 68.10 | 59.13 | 66.41 |
| $F_2$ | 80.21 | 75.18 | 69.00 | 74.80 | 83.32 | 79.22 | 69.12 | 77.22 |
| $F_3$ | 88.00 | 82.00 | 78.00 | 82.67 | 91.00 | 86.00 | 78.15 | 85.05 |
| $F_4$ | 62.10 | 59.15 | 55.12 | 58.79 | 67.00 | 64.00 | 57.00 | 62.66 |
| Mean of S.M.R. | 71.48 | 66.70 | 60.64 | 66.27 | 74.90 | 70.50 | 61.48 | 68.96 |
| L.S.D. for S.M.R. at | 5% : 1.312 1 % : 1.77 | | | | 5%: 1.444 1 % : 1.95 | | | |
| L.S.D. for Fertilizer at | 5%: 1.016 1% : 1.37 | | | | 5%: 1.118 1% : 1.51 | | | |
| L.S.D. for (M × F) at | 5%: 2.273 1% : 3.07 | | | | 5%: 2.500 1% : 3.37 | | | |
| L.S.D. for (1st × 2nd) varieties at | 5% : 0.819 | | | | 1% : 1.093 | | | |

**Table 7:** Dry matter of grains yield of rice plants (gm / pot) as affected by different levels of fertilizers, duration of irrigation and varieties

| Fertilizer Treatments | 1st variety (Giza 176) | | | Mean of fertilizer | 2nd variety (Sakha 102) | | | Mean of fertilizer |
|---|---|---|---|---|---|---|---|---|
| | Soil moisture regimes | | | | Soil moisture regimes | | | |
| | $M_1$ | $M_2$ | $M_3$ | | $M_1$ | $M_2$ | $M_3$ | |
| $F_0$ | 48.00 | 44.11 | 36.12 | 42.74 | 52.10 | 49.28 | 38.10 | 46.49 |
| $F_1$ | 62.00 | 58.00 | 49.26 | 56.42 | 65.22 | 61.13 | 52.00 | 59.45 |
| $F_2$ | 72.10 | 68.15 | 58.00 | 66.08 | 76.00 | 72.00 | 62.00 | 70.00 |
| $F_3$ | 79.25 | 73.11 | 60.00 | 70.78 | 83.10 | 76.15 | 76.12 | 78.46 |
| $F_4$ | 56.00 | 52.00 | 46.28 | 51.42 | 59.10 | 55.18 | 52.00 | 55.42 |
| Mean of S.M.R. | 63.47 | 59.07 | 49.93 | 57.49 | 67.10 | 62.74 | 56.04 | 61.96 |
| L.S.D. for S.M.R. at | 5% : 1.251 1 % : 1.69 | | | | 5%: 1.221 1 % : 1.65 | | | |
| L.S.D. for Fertilizer at | 5%: 0.969 1% : 1.31 | | | | 5%: 0.946 1% : 1.28 | | | |
| L.S.D. for (M × F) at | 5%: 2.167 1% : 2.92 | | | | 5%: 2.115 1% : 2.85 | | | |
| L.S.D. for (1st × 2nd) varieties at | 5% : 0.541 | | | | 1% : 0.722 | | | |

Data also show that the inorganic fertilizer treatments ($F_1$ and $F_2$) significantly increased all the previous parameters as compared with the organic fertilizer treatment alone ($F_4$). The highest values of plant height, number of tillers, root volume, root dry matter and straw and grain yield were obtained when organic and inorganic fertilizer treatment was used ($F_3$), followed by $F_2$, $F_1$, $F_4$ and $F_0$ in decreasing order, this trend may be attributed to increased microbial respiration stimulated by organic matter and this may indicate the complementary effect of organic and inorganic fertilizer in meeting the nutrition requirements of rice plants. Also, data show that increasing the rate of inorganic fertilizer ($F_2$), the growth parameters as well as straw and yield of rice significantly increased as compared with the fertilizer treatment of $F_1$. It is evident that variation in either of the rates of N, P, K and organic matter brings proportional

changes in the studied parameters. Confirm these results Panda et al., (1986) stated that yield of rice was increased by 521 kg/ha at a N:P:K dose of 60: 30: 30 and by 996kg/ha at 90:45:45 over that of the in fertilized control.

Results show that application of organic and inorganic fertilizer together ($F_3$) make the availability of plant nutrients from both sources together proved advantageous as the rice plants could meet their requirements rapidly from inorganic fertilizer and more steadily from the organic source as already explained by Ghosh and Sharma (1999),Ghosh (2000),Sharawat, (2004) and Kaleem and Almas (2012).who stated that application of organic and inorganic fertilizers together had a significantly positive effect on all agronomic parameters (plant height, umber of tillers, and weight of grains) when compared with that of organic and inorganic sources each alone. These increases in growth parameters and rice yield observed from the manuered treatments were directly results of greater nutrient supply from the manure upon fertilization (EgrinyaEneji et al., 2000). Confirm these results Willett (1995) and Siam et al., (2014) reported that organic matter amendment improved the effectiveness of applied fertilizers and increased rice yield.

**Interaction between soil moisture regime and fertilizer treatments:**

Tables (2-7) showed that all the growth parameters and straw and grain yield of rice plants responded greater to fertilizer treatments under submergence treatment ($M_1$) than under the other soil moisture regimes ($M_2$ and $M_3$). It seems therefore that the efficiency of different fertilizers interns of rice yield may differ according to water regimes. Concerning the effect of interaction between the tested variables and rice dry matter and yield production, it was found that soil moisture regimes, and fertilizer treatments significantly affected the growth and yield of rice plants each alone, yet both variables together significantly affected the previous parameters. Results show that the highest values of studied parameters were obtained under soil moisture regime of submergence ($M_1$) and fertilizer treatment of organic and inorganic fertilizers together ($F_0$), while the lowest values were obtained under soil moisture regime of $M_3$ and unfertilized treatment ($F_3$). Confirm these results Mohamed et al., (1998) stated that combination of continuous flooding and 120 kg N/ha gave the highest grain yield and a moist soil with no nitrogen application gave the lowest yield of rice and the effect of both variables together on dry matter was significant Singh, et al., (2010). On the other hand, Sahoo et al., (1970) found that heavy application of organic matter in presence of continuous submergence depressed grain yield and nutrients uptake.

Rice straw yield (Table 6), plant height (Table 2) and roots dry matter of rice plants (Table 5) grown under submergence ($M_1$) without any fertilizer ($M_1$ $F_0$) were significantly higher as compared with those grown under soil moisture regime of $M_3$ and fertilized with $F_4$ treatment ($M_3F_4$), however, the previous parameters of rice plants grown under soil moisture regime of $M_3$ and fertilized with $F_1$ treatment, were not statistically differ from those grown under submergence and not fertilized ($M1F_0$). The butter results of the submergence without fertilizer ($M_1F_0$) than those of fertilized with $F_4$ treatment at soil moisture regime of M3 ($M_3F_4$) conditions was due to higher assimilation of N, P, K, Ca, Mg and Mn which were released more in the soil solution under the submergence ($M_1F_0$) more than $M_3$ treatment.

Grain yield (table 7) and numbers of tillers/plant (Table 3) under submergence ($M_1$) and without fertilizer ($M_1F_0$) did not show any significantly differences when compared with those grown under soil moisture regime of $M_3$ and fertilized with $F_1$ or $F_4$ ($M_3F_1$ and $M_3F_4$). This mean, that it can be concluded that soil at ($M_3$) soil moisture can meat the water demands of the most vigorously growing rice plants at ($M_1$) by supplying extra fertilizers. Came to the same results Vang et al., (1999) stated that the additional application of nutrients in the form of fertilizers at field capacity condition can equate the benefits of submergence. They found that organic matter addition minimized the reduction of growth caused by loss of soil-water saturation by increasing the water holding capacity of soils and reducing the need for irrigation.

The obtained results in this investigation are in good harmony with those obtained by Tano et al., (1995) and Subudhi and Pradhan (1996), who stated that rice biomass and grain yield were positively affected by nitrogen fertilization and 4-day period of drying. The 8-day period of drying reduced rice growth and yield because of lesser availability of nitrogen. They added that continuously submerged and supplying inorganic and organic fertilizer in combination (10:15: 20 NPK + 1.5 kg FYM/$m^2$) gave the tallest seedlings and the highest yield. Also, Pathak et al., (2010) who stated that urea plus FYM treatment recorded maximum grain yield of when.

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