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# Performance of Groundnut Varieties on Application of FYM and Biodigester Liquid at Various Levels Under Rainfed Condition

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**Abstract**

A field experiment was carried out under rainfed condition during *kharif* of 2009. The soils were red sandy loam in texture and initial soil status of the soils were pH 4.91, EC (0.042 dS/m), low in organic carbon status (0.21%), low in available N (246.5 kg/ha), medium in available $P_2O_5$ (29.2 kg/ha) and medium in available $K_2O$ (221.3 kg/ha). Whereas the initial soil status of JL-24 plot with a pH of 5.01, EC (0.05 dS/m), low in organic carbon status (0.32%), low in available N (225 kg/ha), low in available $P_2O_5$ (22.3 kg/ha) and medium in available $K_2O$ (162 kg/ha). Application of FYM 10 t/ha + biodigester liquid manure (equivalent to 30 kg N/ha) in two splits recorded significantly highest pod yield of 1200 kg/ha (TMV-2) and 1362 kg/ha (JL-24). However, the second best treatment is application of FYM 10 t/ha + biodigester liquid manure (equivalent to 20 kg N/ha) in 2 splits recorded pod yield of 1008 kg/ha (TMV-2) and application of FYM 10 t/ha + biodigester liquid manure (equivalent to 25 kg N/ha) in two splits recorded pod yield of 1,119 kg/ha (JL-24). However the lower pod yield was recorded with Application of FYM 5 t/ha + BD liquid (equivalent to 10 kg N/ha) in two splits (683 kg/ha) of TMV-2 variety. Application of FYM 5 t/ha + BD liquid (equivalent to 20 kg N/ha) in two splits (679 kg/ha) of JL-24 variety recorded lower pod yield.

**Key words : Biodigester liquid manure, Groundnut varieties, TMV-2, JL-24, Pod yield.**

Organic farming is gaining importance in the recent years due to realization of inherent advantages it confers in sustaining crop production and also in maintaining dynamic soil nutrient status and safe environment. Farmyard manure, compost, vermicompost, green menuring, agro-wastes and plant wastes and farm wastes both for sustainability of soil organic carbon and supply of plant nutrients in traditional organic farming. In the existing technologies of organic farming where FYM and compost are used as source of nutrient supply, productivity of soils depletes during the transitory period (until fertility, structure and microbial activity of the soil had been restored) leading to low yields in initial years of cultivation (1). Besides, in the light texture soils of semi arid regions bulky organic materials remain in undecomposed state for years due to inherent deficiency of soil organic carbon and microbial biomass responsible for decomposition of these materials. Hence it is imperative to evolve an alternative technology of organic farming that provides reasonable yields while restoring the fertility of soil during transitory period. The use of fermented Biodigester liquid organic manure as a foliar application have been introduced to modern agriculture in recent years to produce good quality produce. The present investigation was hypothesized to examine performance of groundnut varieties (TMV-2 and JL-24) to FYM and biodigester liquid at various levels under rainfed condition.

## Methods

A field experiment was carried out at ARS, Balagijapade of UAS, GKVK, Bangalore under rainfed condition during *kharif* of 2009. The soil was red sandy loam in texture and initial soil status of the TMV-2 plot soils were pH of 4.91, EC (0.042 dS/m), low in organic carbon status (0.21%), low in available N (246.5 kg/ha), medium in available $P_2O_5$ (29.2 kg/ha) and medium in available $K_2O$ (221.3 kg/ha). The treatments include three levels of FYM (5.0, 7.5 and 10.0 t/ha) and three levels of biodigester liquid manure (equivalent to 10, 20 and 30 N kg/ha). The composition of FYM is 0.58% N, 0.30% $P_2O_5$ 0.62% $K_2O$ and biodigester is 0.45% N, 0.28% $P_2O_5$ and 0.64% $K_2O$. The experiment was laid out in randomized complete block design with three replications.

**Table 1.** Pod yield and economics of groundnut (var TMV-2) as influenced by FYM and biodigester liquid manure under rainfed condition.

| Treatments | Pod yield kg/ha | Cost of cultivation Rs./ha | Gross return Rs./ha | Net return Rs./ha | B : C ratio Rs./ha |
|---|---|---|---|---|---|
| FYM 5t + BLME equiv to 10 kg N/ha | 683 | 12795 | 16665 | 3870 | 1.30 |
| FYM 5t + BLME equiv to 20 kg N/ha | 738 | 13005 | 18007 | 5002 | 1.38 |
| FYM 5t + BLME equiv to 30 kg N/ha | 841 | 13215 | 20521 | 7306 | 1.55 |
| FYM 7.5t + BLME equiv to 10 kg N/ha | 850 | 13185 | 20740 | 7555 | 1.57 |
| FYM 7.5t + BLME equiv to 20 kg N/ha | 905 | 13395 | 22082 | 8687 | 1.65 |
| FYM 7.5t + BLME equiv to 30 kg N/ha | 913 | 13605 | 22277 | 8672 | 1.64 |
| FYM 10t + BLME equiv to 10 kg N/ha | 989 | 13575 | 24131 | 10556 | 1.78 |
| FYM 10t + BLME equiv to 20 kg N/ha | 1008 | 13785 | 24400 | 10615 | 1.77 |
| FYM 10t + BLME equiv to 30 kg N/ha | 1200 | 13995 | 29280 | 15285 | 2.09 |
| FYM 7.5t + 25 : 50 : 25 kg NPK/ha | 980 | 14120 | 23912 | 9792 | 1.69 |
| SE ± | 33.97 | | | | |
| CD at 5% | 100.93 | | | | |

The initial soil status of JL-24 plot was with a pH of 5.01, EC (0.05 dS/m), low in organic carbon status (0.32%), low in available N (225 kg/ha), low in available $P_2O_5$ (22.3 kg/ha) and medium in available $K_2O$ (162 kg/ha). The treatments include three levels of FYM (5.0, 7.5 and 10.0 t/ha) and three levels of biodigester liquid manure (equivalent to 20, 25 and 30 N kg/ha).

The experimental plots were selected separately in the station and impose the treatments based on the initial analysis of the organic manures. Biodigester liquid was prepared by farm wastes available in farm itself along with cow urine and dung are placed over the organic waste materials filled in the tank as a starter material. The bio-gas slurry can also be used instead of cattle dung for the biodigester. Agro-based industrial organic wastes can be used along with other farm wastes. Water was filled till the organic wastes get immersed and then left it for 15-20 days. Afterwards the ready liquid manure was collected in collection pit. Mean while, the washings from the cattle shed or pig shed or inflow from the biogas plant will continue to be received. Biodigester manure can be applied along with FYM/compost/to the crops and also top dressed in split doses. Quantity of liquid manure required for a given crop is estimated based on nitrogen content. Prior to application of biodigester liquid manure was analyzed for its nitrogen content. On the basis of nitrogen content, required quantity of biodigester with 1 : 10 dilutions (biodigester : water) was applied. Biodigester liquid manure was applied to the crop in open furrows 10 cm away from crop row. Biodigester was applied four times i.e. three hours before sowing, 30, 60 and 90 days after sowing (DAS).

## Results and Discussion

### *TMV-2*

Pod yield of TMV-2 variety of groundnut was influenced significantly by FYM and biodigester liquid manure application at various levels (Tables 1 and 2). Application of FYM 10 tonnes + bio-digested liquid manure equivalent to 30 kg N/ha produced significantly highest pod yield (1200 kg/ha). Lowest pod yield was recorded with FYM 5 tonnes + biodigested liquid manure equivalent to 10 kg N/ha (683 kg/ha). High pod yield was associated with yield attributing characters viz. number of mature pods/plant, kernel weight, shell percentage. It might be due to better growth attributes viz., plant height, number of primary branches etc. Biodigester liquid manure applied at 30 kg/ha recorded increase in pod yield may be due to the neason that nitrogen and phosphorus play an important role in the synthesis of chlorophyll and amino acids, Biodigester liquid manure ensured the continuous supply of these nutrients, while FYM beside supplying N, P and K also improved the soil condition, which enhanced the root proliferation and source to sink relationship. Ravi Kumar (2) opined for panchagavya spray that the easy transfer of nutri-

**Table 2.** No. of filled pods per plant and yield of Groundnut (var JL-24) as influenced by organic manures under rainfed condition.

| Treatments | No. of filled pods/plant | Yield kg/ha |
|---|---|---|
| FYM 5.0 t/ha + B. D liquid manure (equiv. to 20 kg N/ha) in 2 splits | 21 | 679 |
| FYM 5.0 t/ha + B. D liquid manure (equiv. to 25 kg N/ha) in 2 splits | 23 | 757 |
| FYM 5.0 t/ha + B. D liquid manure (equiv. to 30 kg N/ha) in 2 splits | 23 | 839 |
| FYM 7.5 t/ha + B. D liquid manure (equiv. to 20 kg N/ha) in 2 splits | 24 | 905 |
| FYM 7.5 t/ha + B. D liquid manure (equiv. to 25 kg N/ha) in 2 splits | 25 | 985 |
| FYM 7.5 t/ha + B. D liquid manure (equiv. to 30 kg N/ha) in 2 splits | 25 | 1025 |
| FYM 10 t/ha + B.D liquid manure (equiv. to 20 kg N/ha) in splits | 25 | 1115 |
| FYM 10 t/ha + B. D liquid manure (equiv. to 25 kg N/ha) in 2 splits | 25 | 1199 |
| FYM 10 t/ha + B. D liquid manure (equiv. to 30 kg N/ha) in 2 splits | 25 | 1362 |
| Rec. practices (7.5 t FYM + 25 : 38 : 25 NPK kg/ha) | 22 | 943 |
| SE ± | 0.67 | 46.2 |
| CD at 5% | 2.00 | 138.4 |

ents to plant through foliar spray and the quantities of IAA and GA present in panchagavya. Somasundaram (3) reported that these applications created stimuli in the plant system and which in turn increased the production of growth regulators in cell system. Hence, it stimulated the necessary growth and development in plants, leading to better yield.

Economics of the TMV-2 variety of groundnut was significantly influenced by organic manures. Net return was maximum with FYM 10t + biodigested liquid manure equivalent to 30 kg N/ha (Rs 15,285) with gross return of Rs 29,280 and which was closely followed by FYM 10t + biodigested liquid manure equivalent to 20 kg N/ha. It had higher B : C ratio of 2.09 obtained with FYM 10t + biodigested liquid manure equivalent to 30 kg N/ha. Application of recommended dose of FYM and fertilizers resulted in a B : C ratio 1.69 with gross returns of Rs. 23912/ha. Lowest economic returns were obtained with FYM 5t + biodigested liquid manure equivalent to 10 kg N/ha (1.30 of B : C ratio and Rs 16,665 of gross returns, respectively). This was attributed to higher pod and hulm hield of groundnut with these treatments. Similar results of higher gross return and net return were obtained with application of panchagavya by Yadav and Lourduraj (4) in rice. Natarajan (1) opined increased yield of crop plants with panchagavya application due to enhancement in the biological efficiency of crop plants.

*JL-24*

Number of pods was significantly influenced by organic manures of JL-24 variety. Application of FYM 10 tonnes + Biodigested liquid manure equivalent to 30 kg N/ha produced significantly highest pod yield (1,362 kg/ha). However, the next best treatment is application of FYM 10 tonnes + biodigested liquid manure equivalnt to 25 kg N/ha produced pod yield of 1, 119 kg/ha. Lowest pod yield was recorded with FYM 5 tonnes + biodigested liquid manure equivalent to 20 kg N/ha (679 kg/ha). This significant influence on growth characters might have been due to the enhancement uptake of nutrients favoured by the addition of organic manures. Higher yield response due to organics is ascribed to imporvement in physical and biological properties of soil resulted in better supply of nutrients leads to good crop growth and yield (5). The improvement in yield may be due to addition of high N fixing bacteria along with jeevamruta. This contention holds credence because addition of jaggery, pulse flour coupled with continuous stirring while preparing jeevamruta may help in proliferation of N fixing bacteria at a faster rate (6).

*Conclusion*

Application of farm yard manure at 10 tonnes per hectare along with Biodigester liquid manure equivalent to 30 kg per hectare achieved the highest pod yield in both JL-24 and TMV-two varieties significantly. Continuous application of biodigester liquid manure at higher rates will leads to sustainability in terms of yield, economics and soil.

**References**

1. Nagarajan K. 2002. *Panchagavya- A manual.* Other

India Press, Mapusa, Goa, India. 13—27. pp.
2. Ravi Kumar H. S. 2009. Development of agro techniques for the production of organic groundnut (*Arachis hypogaea* L.) under rainfed condition. M.Sc. (Ag.) thesis. Univ. Agric. Sci., Bengaluru, India.
3. Somasundaram E. 2003. *Evaluation of organic sources of nutrients and Panchagavya spray on the growth and productivity of maize sunflower-greengram system. Ph. D thesis*. Tamil Nadu Agric. Univ., Coimbatore, India.
4. Yadav B. K. and C. A. Lourduraj. 2006. Effect of organic manures and *Panchagavya* spray on rice (*Oryza sativa* L.) quality. Crop Res. 32 : 6—10.
5. Kumavat R. N., S. S. Mahajan and R. S. Mertia. 2009. Growth and development of groundnut *(Arachis hypogia)* under foliar application of *Panchagavya* and leaf extracts of endemic plants. *Ind. J. Agron.* 54 : 324—331.
6. Joshi M. 2009. *Personal communication*. UAS, GKVK, Bengaluru, India.