Agric Res J **58** (5) : 888-891, *October* 2021
DOI No. 10.5958/2395-146X.2021.00127.7

EFFECT OF ORGANIC FERTILIZER PREPARED FROM FISH WASTE ON GERMINATION AND MORPHOLOGICAL CHARACTERISTICS OF GROUNDNUT

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Groundnut (*Arachis hypogaea*) cultivated on 6.7 million hectare area in the country, is an important source of edible oil and vegetable protein (Prasad et al., 2011). Application of organic manures may improve availability of native nutrients in soil as well as the efficiency of applied fertilizers (Sawrup, 2010). It is considered important for crops like groundnut which is also consumed raw and used in confectionery. By-products of the fish processing industry can be used as a source of nutrients for crops (Radziemska et al., 2016; Balkhande, 2020). Composting fish wastes could serve an effective source of nutrient-rich fertilizer and provide an environment friendly cost effective alternative to its disposal (Martin, 2007, Subbu Lakshmi ,2015). Fish waste compost contains about 1.18% N, 0.48% phosphorous and 0.58% potassium (Balkhande, 2020).

Keeping in view the lack of information on the effect of sea product wastes on crops, the effect of organic fertilizer prepared from fish waste on seed germination and morphological characteristics of groundnut (*Arachis hypogaea*) was studied.

Field experiment was conducted at farmer's field at Chikala Tq. Hadgaon district Nanded during winter 2019. Four groundnut varieties CGD, Dhule, Ghungru and TAG 24 were sown on 25 February 2019. Total 80 seeds were sown in both the bed of each variety. The soil quality was assessed in the department of Soil Science and Soil Chemistry at Vasantrao Naik Agricultural University, Parbhani. Some parameters of farm soil was analyzed and they were pH- 7.5, Electrical conductivity- 0.39 $dsm^{-1,}$ organic carbon - 0.65%, Free carbonates- 8.8%, Nitrogen- 175.15 kg/ha, Potassium- 12.70 kg/ha, Phosphorous- 480.24 kg/ha. Analysis of some micronutrients also carried out they are, Cu- 2.4 ppm, Fe- 10.6 ppm, Mn-7.5 ppm and Zn- 1.9 were found in permissible limit. The fish waste fertilizer was applied to the the experimental bed @ 50kg/bed.

Seed germination in each variety was counted on the 7^{th}, 8^{th} and 9^{th} day after sowing. Beds were prepared, one was referred as control whereas other bed were treated as experimental bed. The experiment was conducted in triplicates. Approximately size of bed for this experiment was 3.048 meter with 25 cm between and 10 cm between the plant. On 26^{th} June 2019 crop were harvested, before harvested daily visit was done to the field. All necessary agronomic operations were carried out such as hoeing and weeding in every 2 to 3 weeks after sowing.Irrigation was given as per need I.e.on every 15 days.

After the sowing, on 7th day the 62 seeds of Ghungru variety germinated, thereafter CGD, Tag- 24 and Dhule germinated 46, 25, 17 seeds respectively. Remaining seeds were germinated in next two days. It was observed that overall percentage of seed germination was more in Ghungru as compared to other three varieties. The percentage of seed germination in control bed (Table 1) was recorded as Ghungru (93.7%), CGD (92.5%), Tag-24 (87.5%) and Dhule (85%).The organic fertilizer prepared from fish waste was spread in experimental bed before the seeds sown. Total 50 kg organic fertilizer was spread in the experimental bed. Similar observation was record in this set i.e. it also takes 7 day for germination. But the rate of germination on 7th day was more as compare to control bed. Here Ghungru variety gives 100% germination rate; out of 80 seeds all 80 were germinated. Dhule variety showed 97.5% germination with 78 seeds germinated, whereas CGD having 96.2% with 77 seeds germinated and Tag-24 variety showed 92.5% germination rate with 74 seeds germinated. In the experimental bed the percentage of germination (Table No.2) was more as compare to control bed. As per the one way ANOVA test, the *f*-ratio value is 8.85244. The *p*- value is .017727. The result is significant at $p < .05$. According to (Atiyeh *et al.,* 2002; Arancon *et al.,* 2006 and Vaithiyanathan and Sundaramoorthy, 2016) the organic fertilizer such as vermicompost has plant growth regulating substances including plant growth hormones and humic acids which are probably responsible for increase in germination, growth and yield of plants. Seed germination percentage in experimental bed was more as compare to control. (Alam *et al*., 2014) studied the effects of organic fertilizers on the seed germination and seedling vigour of tomato, they used trichocompost, vermicompost, kitchen waste compost for their experiment. They found that germination of seeds affected by different types of organic fertilizer and ranged from 65.3 to 94.0%. This is in agreement with our findings.

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Date of receipt: 12.01.2021, Date of acceptance: 28.07.2021

As per Table No.2 and 3 some morphological characteristics were studied. Total Plant height, Color of flowers, color of leaves, leaf length, leaf width, pod size and pod per plant were studied . Among 4 varieties CGD showed highest height in both bed, in control bed it was 37.52 ±1.608072cm whereas in experimental bed the value was 39.39 ± 2.213707 cm. thereafter Tag- 24 having length 33.11 ± 2.436059 cm, Dhule 30.97± 3.141079 cm and Ghungru 28.94 ± 1.316871 cm respectively in control bed. In control bed leaf length of the CGD, Dhule, Ghungru and Tag-24 were 2.4 cm, 2.9 cm, 2.8 cm and 2.4 cm recorded respectively. Along with the leaf length, leaf width was in ranged between 1.1 cm to 1.6 cm. 1.6 cm leaf width was recorded in Dhule variety. Pod size is one of the important morphological characters also measured during the study. Here the CGD variety having more size 3.2 cm among all varieties. Pod size recorded in between 2.9 to 3.2 cm, which was not more difference in all varieties of peanut. After the plants maturity, number of pod per plant was measured and it was found that among 4 varieties Ghungru had highest pod i.e. 16 pod per plant in an average recorded. Thereafter Tag-24 variety had 15 pods per plants whereas CGD had 14 and Dhule 12 pods per plant counted.

Morphological parameters in fish waste compost bed was also assessed and it was observed that total height of all varieties were more in fish waste compost bed as compare to control bed. The height of CGD was 39.39 ±2.213707 cm which was more in all the varieties in control as well as in experimental bed. Heights of the plant of other three varieties were somewhat near with each other. Total height of Dhule, Tag-24 and Ghungru were 38.42 ±1.761100 cm, 37.51 ±1.708872 cm and 35.51±1.226304 cm recorded respectively. The length of the leaves all four varieties were between 2.5 cm to 3.5 cm, whereas width of leaves among all varieties of peanut were recorded in the ranged of 1.4 cm to 2.1 cm. Dhule variety had highest length among all.The pod length of all varieties in experimental bed were more as compared to control. According to our findings, it was observed that Ghungru variety have more length of pod and pod per plant in all varieties and both the bed. The size of pod in Ghungru was 4.1 cm and 19 pods per plant in an average were recorded. The pod size of Dhule, Tag-24 and CGD were in between 3.1cm to 3.7 cm. on the basis of pods per plant the Tag-24 had 17 pods then CGD and Dhule variety had 16 and 14 pods/ plants respectively.

On the basis of these parameters it was found that because of NPK and other micronutrients in fish waste manure may be responsible for higher growth in fish waste compost bed as compare to control bed. According to (Lourduraj, 2000) application of organic manure with recommended fertilizers significantly enhance the growth parameters of groundnut. (Mohanty *et al.* 2005) conducted an experiment to find out the response of groundnut to the application of different organic manure (FYM, Poultry and Vermicompost) and observed growth parameters was significantly superior to control. Another researchers done their work in a same way Gopalakrishnan (2007) have reported while organic sources besides supplying N, P and K also improved the soil condition, which enhanced the root proliferation and source-sink relationship. This significant influence on growth characters might have been due to the enhancement of uptake of nutrients favoured by the addition of organic manures. In our study NPK % was found in a good quantity in fish waste fertilizer, these findings gives confirmation to our

Table 1. Percentage of germination of peanut (*Arachis hypogaea*) 4 different varieties (Control)

Sr. No.	Variety of Peanut	Number of seeds germinated (Days after sowing)			Total on 9th day	Percentage germination on 9th day
		0-7th day	7th-8th day	8th-9th day		
01	CGD	46	20	08	74	92.5
02	Dhule	17	44	24	68	85
03	Ghungru	62	10	03	**75**	**93.7**
04	Tag-24	25	30	15	70	87.5

Table 2. Percentage of germination of peanut (*Arachis hypogaea*) 4 different varieties (Fish waste compost).

Sr. No.	Variety of Peanut	Number of seeds germinated (Days after sowing)			Total on 9th day	Percentage germination on 9th day
		0-7th day	7th-8th day	8th-9th day		
01	CGD	52	25	--	77	96.2
02	Dhule	21	40	17	78	97.5
03	Ghungru	60	15	05	80	**100**
04	Tag-24	68	05	01	74	92.5

Table 3. Morphological characteristics of peanut (*Arachis hypogaea*) 4 different varieties in Control bed.

Sr. No.	Name of Variety	Average Plant height (cm)	Color of flower	Color of Leaves	Leaf length (cm)	Leaf width (cm)	Pod size (cm)	Pods/ plant
01	CGD	37.52 ±1.608072	Bright Yellow	Green	2.4	1.1	3.2	14
02	Dhule	30.97±3.141079	--do--	Dark Green	2.9	1.6	2.9	12
03	Ghungru	28.94 ±1.316871	--do--	Green	2.8	1.3	2.9	16
04	Tag-24	33.11 ±2.436059	--do--	Green	2.4	1.2	3	15

Table 4. Effect on morphological characteristics of peanut (*Arachis hypogaea*) 4 different varieties (Fish waste compost bed).

Sr. No.	Name of Variety	Average Plant height (cm)	Color of flower	Color of Leaves	Leaf length (cm)	Leaf width (cm)	Pod size (cm)	Pods/ plant
01	CGD	39.39 ±2.213707	Bright Yellow	Green	2.5	1.4	3.1	16
02	Dhule	38.42 ±1.761100	--do--	Dark Green	3.2	2.1	3.7	14
03	Ghungru	35.51±1.226304	--do--	Green	3.2	1.5	4.1	19
04	Tag-24	37.51 ±1.708872	--do--	Green	3.5	1.7	3.3	17

results.(Kulkarni *et.al,* 2018) worked on effect of organic and inorganic fertilizers on yield and yield attributes of groundnut and wheat. In their studies they also studied the morphological parameters of groundnut and wheat. They found highest plant height (57.65 cm) was observed in treatment T1 (75% N (FYM) + 25% N (Vermicompost)) i.e. organic fertilizer, number of pods/plant (29.33) was observed in treatment T3 (50% N (FYM) + 25% N (VC.) + Azatobacter/Rhizobium). Mohapatra and Dixit (2010) studied that the applications of organic manures like vermicompost @ 2.5 t ha-1 and 5 t ha-1, FYM @ 5 t ha-1 and biofertilzer (*Rhizobium*, VAM sole and in integration) to groundnut increased its plant height, no. of branchesplant-1and pod yield over RDF through chemical fertilizers. Our results were similar to results obtained these authors in their study.

This is a unique study that waste can be generated into the fertilizer for the welfare of human beings as **best** from **waste**. The NPK % was significant for the seed germination experiment. All four varieties such as CGD, Dhule, Ghungru and Tag-24 were showed positive response towards the organic fertilizer prepared from fish waste. Percentage of seed germination also enhances after the use this fertilizer. Nowadays many farmers moves towards the organic farming, because the use of chemical fertilizer reduces the fertility of the soil and many harmful contents are entered in to the ecosystem through food chain. Farmers should collect the fish waste material and dumped into their farms for composting. It is very simple and cheap method any one can prepared fertilizer from fish waste. This finding will be helpful to the common people for preparation of organic fertilizer from fish waste. Hence for the sake of protection of ecosystem such type of fertilizer should be used in the farm. This is the baseline study; further more investigations are required in this field for better results. This would be a great technology as **best** from **waste**.

Acknowledgement

The author is grateful to Academic Planning & Development Section, S. R. T. M. University, Nanded for financial Assistance in the form of Minor Research Project - APDS/Uni.MRP/Sci.& Tech.-Zoology/20l7-18/ 2967 under Quality Upgradability Scheme.

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