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## OWC 2020 Paper Submission - Science Forum

*Topic 3 - Transition towards organic and sustainable food systems*

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### AGRONOMIC PERFORMANCE OF SOYBEANS AS IMPACTED BY SOIL- AND FOLIAR- APPLIED ORGANIC FERTILIZERS IN THE TROPICS

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**Preferred Presentation Method:** Oral or poster presentation

**Full Paper Publication:** Yes

**Abstract:** Organically produced soybean is <0.1% of total world production despite its increasing demand in the world market. Therefore, field trials were carried out in southwestern Nigeria during the late cropping seasons (July – Nov.) of 2017 and 2018 to evaluate the agronomic performance of three improved soybean varieties: TGx 1448-2E, TGx 1835-10E and TGx 1989-19F as affected by foliar: Arati Baja (1.01% N), Arati Nawoz (2.01% N), D I Grow (3.19% N and 1.49% N) and soil applied organic fertilizers: (Aleshinloye Grade B, 0.56% N and 1.48% N), and control (no fertilizer). The experimental design was Randomized Complete Block Design in a 3 × 5 factorial arrangement in three replicates. Fertilizer application and varietal effects were significant ( $p < 0.05$ ) on nodulation at 10 weeks after sowing, weight of pods and seeds per plant, and grain yield in both years. It was concluded that the soil organic fertilizer or any of the foliar fertilizers can enhance soybean cultivation in the tropics.

**Introduction:** Soybean (*Glycine max* (L.) Merrill) is the most widely produced oilseed crop in the world. However, the volume of organically produced soybean is <0.1% of total world production. Its global market demand is being driven by growth of organic food and feed industries coupled with consumption and awareness of health benefits of organic products (Anon 2019). However, the lull in organic soybean production in the tropics could be attributed partly to inappropriate fertilizer regime, bulkiness of organic fertilizers and low fertility status of tropical soils. There is a dearth of scientific information on organic foliar nutrition in soybean in the tropics. Recent efforts included foliar use of synthetic nutrient sources, and soil and foliar manures (Nagar et al. 2016) Therefore, this study evaluated the effect of three foliar and one soil applied organic fertilizers on growth and yield of soybean in the tropics.

**Material and methods:** The two field trials were carried out on the organic research plots of the Institute of Food Security, Environmental Resources and Agricultural Research, Nigeria located between latitudes 7°13'51.17" N & 7°13'53.16" N and longitudes 3°23'49.12" E and 3°23'51.86" E on altitude 139 m above sea level during the late cropping seasons of 2017 and 2018. During the period of experimentation, a total rainfall of 330.5 and 902.5 mm was recorded in 2017 and 2018, respectively. The soils of the experimental sites were loamy sand in texture and low in nitrogen (0.16 and 0.15 % N), moderate in organic carbon (1.67 and 1.40 %) low in available phosphorus (3.33 and 5.40 mg/kg), very low in



TGx 1448-2E	24.4	5.79	3.92	0.79	11.0	18.03	11.01	1.74
TGx 1035-10E	48.0	16.61	10.93	1.72	69.0	19.80	13.93	2.09
TGx 1989-19F	39.0	16.94	10.65	2.07	36.0	21.30	13.55	2.03
LSD 5%	15.0	1.29	1.25	0.62	17.0	1.340	1.50	0.13
								0
F × V	ns	*	*	*	ns	*	ns	*

\*- significant at P < 0.05 ns – not significant; PWT pod weight, g; SWT Seed weight, g; SYD seed yield, ton/ha

**Discussion:** Soil applied organic fertilizer impacted more than the foliar fertilizers on the agronomic traits of the three soybean varieties. This could be attributed to increase in microbial population in the soil after the application of the organic fertilizer and subsequent increase in biological nitrogen fixation (BNF), release of phosphorus and other growth promoting hormones. Number and weight of pods and seeds per plant were significantly enhanced with the application of both foliar and soil organic fertilizers irrespective of the prevailing growth conditions. Mean seed yield recorded across organic fertilizer treatments (1.30 – 2.11 ton/ha in 2017 and 1.55 – 2.28 ton/ha in 2018) compared favorably with Nigerian (0.97 ton/ha) and African (1.37 ton/ha) but slightly lower than the world's 2.85 ton/ha (FAOSTAT 2018). It is recommended that soil applied organic fertilizer or any of the evaluated foliar fertilizers can be used to enhance soybean productivity in the tropics.

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**Disclosure of Interest:** None Declared

**Keywords:** agronomic traits, foliar fertilization, nodulation, soil organic fertilizer, soybean seed yield