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Assessment Of 300g Sheep Organic Manure On Growth And Yield Of Improved Soybean Seeds (TGX-1951-3F): A Panacea For Global Poverty And Malnutrition.

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***Abstract*:**
Organic Soybean Farming is a good enterprise for global social and economic development. With a global growing demand for healthy - plant-based proteins, specifically organic soybean farming has the ability to reduce poverty (number of world poor people) and increase wealth (number of world rich people). Field trials were carried out at the Research farm of Federal College of Education (Technical) Bichi, Kano State in the Sudan Savannah Zone Nigeria from June to October, 2023. The soil was sandy loam in texture having pH 7.4 with 0.04% organic carbon, N 0.05g/kg-^{1}, P 0.03g/kg-^{1} and K 0.13g/kg-^{1}. The improved soybean seeds (TGX-1951-3F) were collected from Kano State Agricultural and Rural Development Authority (KNARDA). The treatments were soybean and sheep manure, the unit plot size was 4.0 m × 3.0 m replicated three times. Data collected on the agronomic parameters were pooled and subjected to analysis of descriptive mean. Results revealed that 19t of sheep manure yielded 2.3t/ha soybean grain yield and 6.07t/ha dry matter. Also, eight varieties of healthy, delicious and nutritious soybean fortified foods were produced. Social and economic benefits of Organic Soybean Farming to the world citizens were highlighted. The paper concluded that Sheep Organic Soybean Farming indeed, is the ideal farming urgently needed to reduce global poverty and malnutrition and therefore recommended for United Nations-Food and Agricultural Organization, World Health Organization, World Trade Organization, African Development Bank and World Leaders consideration.
Keywords: *Soybean, inorganic and organic fertilizers, yield, world poor and rich people*

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I. Introduction

Rich is having enough money to meet basic needs including food, health, children education, clothing and shelter. Poverty or Poor is about not having enough money to meet basic needs including food, health, children education, clothing and shelter. Soybean, soy bean or soya bean (Glycine max) is a species of legume native to East Asia, widely grown for its edible bean, which has numerous uses (Soybean, Wikipedia 2023). According to Omoigui et al (2020), the soybean plant depends on soil nitrogen for growth, Phosphorous is often the most deficient nutrient, therefore apply optimal phosphorous at the rate of 30kg/ha in the form of single super phosphate inorganic fertilizer (SUPA-3 x 50kg bags) in addition to 2.5 x 50 kg bags of compound inorganic fertilizer NPK 15:15:15 for a good yield. The grain yield of soybean is between 2 to 3 t/ha.

Benefits of Soybean:

Soybean farming has the potential to be an important crop for global social and economic development. Soybean is one of the most important oil seed crop in the world. Oil and protein rich soybean has now been recognized all over the world as a potential supplementary source of edible oil and nutrition (Kaul and Das, 1986). The oil of soybean contains 85% unsaturated fatty acid and is cholesterol free. Soybean seeds contain 43.2% protein, 19.5% fat, 20.9% carbohydrate and a good amount of other nutrients like calcium, phosphorus, iron and vitamins. Soybean has 3% lecithin which is helpful for brain development (Gopalan *et al.,* 1971; Rahman, 1982). Soybean is a stable food of great nutritional value. Its importance ranges from milk production, oil processing, livestock feeds, industrial uses and human consumption of soybean (Addo and Oguntona, 1993). Soyabean has been recognized to be an ideal grain for meeting protein and energy requirement of both man and animal. Soyabean is probably the world's most valuable crop, used as feed by billions of livestock, as a source of dietary protein and oil by millions of people, and in the industrial manufacture of thousands of products. Soyabean is such an extremely rich source of protein and fat, and such a good source of energy, vitamins and minerals (Nwokolo, 1996). Soyabean is regarded as equal in protein to animal foods. It has been found to be excellent for a number of different conditions such as high blood pressure, diabetes – related diseases and many

others (WHF, 2004). Osho and Dashiell (1998) reported that soyabean which has less purchase cost has about 40% protein, 30% carbohydrates, 20% oil and 10% mineral. It is very useful in improving the menu of malnourished children and revitalizing heart and breast cancer patients and has no cholesterol. According to Faryna (1987) and Enwere (1998) soyabean can be as a nutritional supplement for pregnant women, lactating mothers and children. The household use of soyabean is targeted to suit local dishes for Nigerians and communities all over the country. About 140 soyabean products are now available (Enwere, 1998; Osho and Dashiell, 1998; Okoruwa, 2002). A key problem associated with soyabean is that it contains some anti-nutritional factors, which inhibit the availability of the desirable elements such as protein. Fortunately most of these anti-nutritional factors can be destroyed through processing and boiling (Loo, 1978; NAERLS, 1989; Enwere, 1998; Osho and Dashiell, 1998). The processing of raw soybean grains into variety of nutritious foods has been exhaustively described by various authors and especially Loo (1978), NAERLS (1989), Enwere (1998) and Fabiyi (2006).

Inorganic, Chemical, Artificial or Synthetic Fertilizer:

Inorganic, chemical, artificial or synthetic fertilizer may be described as compound where there is a mix of plant nutrients, predominantly the three primary ingredients of inorganic fertilizers are nitrogen (N), phosphorous (P) and potassium (K). The inorganic fertilizers are associated with many problems include, they get washed away by water easily and cause water pollution, they harm microbes, animals, soil and humans, they reduce soil fertility, they are expensive, they provide short term benefits, they change the nature of soil, making it either too acidic or alkaline (https://byjus.com >question-answer). Due to Ukraine-Russia tensions, rising gas and shipping prices, inorganic fertilizers prices will remain high in to 2023 and beyond (https://www. graincenral.com.). Farmers will continue to express shortage of fertilizer in 2023 (https://dailytrust.com.). United Nations- Food and Agricultural Organization and World Trade Organization (2023) said overuse of inorganic fertilizer can lead to the leaching of excess nutrients, such as Nitrogen and Phosphorous in to water bodies, causing eutrophication, algal blooms and other environmental problems
(https://www.drishtiias.com>fertlizer).

Natural or organic fertilizers:

Natural or organic fertilizers composed of organic matter (carbon based), and are used to improve the quality and quantity of plant growth, examples of organic fertilizers include manure – animal droppings, slurry, animal urine, peat, seaweed, compost, and green manure plants. Organic Fertilizer Association of Nigeria (OFAN, 2004), said that global trend is preference for food grown with organic fertilizers. It urged the federal government of Nigeria to encourage and promote the use of cheap, locally available, environmental and human friendly organic fertilizer in Nigeria, while reducing the importation of inorganic fertilizer. Sheep dung or sheep manure has been used extensively in growing of farm crops. It is a natural, slow-release fertilizer, it provides adequate nutrition to the soil and it enables plants to grow strong roots with good plant production. It can be applied in large quantity to plants because it does not cause burn to the plant root and does not have strong odour (ASAED 1998).

Processed soybean foods:

The World and Nigeria in particular is seriously facing a growing demand for food, income and employment. Agricultural legume crops such as Senna obtusifolia - Tafasa mechanical cultivation and industrial processing can completely put an end to Nigeria youths unrests-cults, kidnappings, bandits, unemployment, Fulani herdsmen and farmer clashes (Abdulazeez, 2018). Abdulazeez (2023) reported that healthy food (Organic Food) is a natural food free of artificial substances good for body and helps the body resist sickness. Soybean meal is the highest quality plant protein nutrient in the world that can serve as the basic source of protein for reducing malnutrition in the world. Before using soybean as food, raw soybean seeds must be heat – treated to break down trypsin inhibitor's activity. Processed soybean foods include various products such as tofu (bean curd), kinako (roasted soy powder), soy milk, miso. Soybean oil has been traditionally appreciated as a high quality commodity in the world oil market and widely used in many food and non food applications (Cober, 2009). Oyewole et al (2019) reported that rural households in Iseyin Local Government of Oyo State, Nigeria, used soybean grains to make soy cheese, soy milk, soy locust bean (magi), soy cake, soy flour, soy pap, soy garri, soy snacks, cooking oil, soy Akara – cake, and soy soup, however, the short shelf life of soybean food products is the constraint of highest importance. Soybean is also used to produce biodiesel. Biodiesel "methyl soyate" is a renewable substitute for petroleum diesel with reduced greenhouse gas emissions. Results of numerous medical studies have indicated on the importance role of soybean in the prevention and curing of chronic diseases (Jayachandran 2015).

Malnutrition:

Malnutrition is one of the universal public health issues affecting populations worldwide. In addition, it is an obstacle to the eradication of the poverty. Therefore, it is estimated that with the elimination of malnutrition, about 32% of the worldwide disease burden could be removed (Katona, et al 2008). The 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) has provided a framework to promote sustainable development. One of the SDGs, SDG 2, is to "end hunger, achieve food security and improved nutrition, and promote sustainable agriculture" (UNGA, 2021). Malnutrition can be categorized into under nutrition (e.g., wasting, stunting, and underweight), over nutrition (e.g., obesity), and micronutrient-related malnutrition (WHO, 2020). Under nutrition has been reported to be accounted for 45% of all child deaths either as a direct or underlying cause (Black, et al 2013). Also, an estimated of 40 million children under 5 years are considered overweight and 678 million adults are categorized to be obese (UNICEF, 2020).

Poverty:

Poverty is a global problem. UNDP (2023) reported that 165 million people fell in to poverty between 2020 to 2023 as debt servicing crowded out social protection, health and education expenditures. Many people in the world are living on less than $3.65 a day. That number also includes extreme poverty that is defined by the UN as " a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health facilities, shelter, education, job opportunities, low income, and lack access to information and justice". Several solutions have been proposed to address the burden of malnutrition and poverty. These include: healthy food and physical environment, access to basic services (e.g. wash, sanitation, hygiene, and health care), diverse and nutritious food products, and exclusive breastfeeding for the first 6 months of life. In addition, all nutrition experts and policy makers must work together to strengthen the government agencies that focuses on nutrition policy and address urgent nutrition problems across the life cycle including infants, children, elderly, pregnant, and lactating women (Herrera, et al 2020). Malnutrition (under nutrition) is caused by a lack of nutrients, either as a result of a poor diet or problems absorbing nutrients from food. Nigeria has the second highest burden of stunted children in the world, with a national prevalence rate of 32 percent of children under five. An estimated 2 million children in Nigeria suffer from severe acute malnutrition (SAM), but only two out of every 10 children affected is currently reached with treatment. Seven percent of women of childbearing age also suffer from acute malnutrition (UNICEF 2022). Food is the greatest weapon in the defense of national security. To stay healthy, human bodies need plenty of body building food such as soybean. This is especially true for growing children, women who are pregnant or breast feeding and older people (David et al, 1993).

Significance of the study

The world organizations (FAO and WTO) noted that the inorganic fertilizer price will remain high and overuse of the inorganic fertilizer can lead to environmental problems. Poverty and malnutrition are global problems that require urgent solution. There is scanty information on assessment of 300g Sheep Organic Manure on Growth and Yield of Improved Soybean Seeds (TGX-1951-3F): A Panacea for Global Poverty and Malnutrition

Aim:

The aim of the study is to carry out a trial on assessment of 300g Sheep Organic Manure on Growth and Yield of Improved Soybean Seeds (TGX-1951-3F): A Panacea for Global Poverty and Malnutrition

The objectives of the trail:

Specifically the trial sought to:

1. To improve global food security, production of healthy food, reduce global malnutrition and environmental pollution and increase agricultural incomes among word rich and poor citizens.
2. To fortify the Nigerian commonly consumed carbohydrate foods with healthy- nutritious-plant-protein (organic soybean grains) for commercialization at micro, small, medium and large entrepreneurial opportunities.
3. To press forward Colleges of Education Academic Staff Union (COEASU) efforts in research for commercialization, national social and economic development.

II. Materials and Methods

Materials:

The materials employed for the trials are: improved soybean seeds (TGX-1951-3F), electronic balance, cloth tape (200cm), local hoe, cutlass, tractor mounted disc harrow, sheep manure, nylon bag and writing materials.

Experimental Site and Field Management:

Field trial was carried out between June to October 2023 at Research Farm, Federal College of Education (Technical), Bichi, latitude 8^0 14' - 12^0 14^1E and longitude 12^0 14' -14^0 13'N, 2775m above sea level, average temperature per annum 25^{0c} and average rainfall 80cm, Sudan Savannah Zone of Nigeria.

Field Preparation, Treatment and Crop Husbandry:

The trial field was plowed and harrowed to a depth of 15 cm. The treatments were improved soybean grains and sheep manure. The unit plot size was 4.0 m × 3.0 m replicated three times with an alley of 1m between plots.

Plant spacing and sowing:

Two seeds per hill were manually sown at a spacing of 75cm between rows, 20cm between stands and at depth of 4cm, and thinned to one, a week after planting, resulting in 80 plants plot^{-1} (66,666.6 plants ha^{-1}).

Sheep manure application:

300g of sheep manure was applied once to each stand of the soybean plants in all the three plots at one week after emergence.

Weeding:

First weeding was carried out manually at third week after emergence and the 2nd at 4th week after the first weeding.

Harvesting:

The soybean was harvested at 4 months when about 85% of pods turned brown, with hoe cut at ground level then, stacked loosely on tarpaulin in open space for two weeks to dry.

Threshing:

Threshing was carried out manually, by pilling the soybean plants on tarpaulin and beating with sticks. The beaten soybean plants were then winnowed to separate the seeds from the debris. The seeds were dried further for one week in open space then bagged.

Data Collection: Measurement of Plant Growth and Yield Parameters and Statistical Analysis:

Five plants from each plot were randomly selected for collection and measurement of growth and yield parameters. The plants were carefully uprooted at maturity. Plants and pods maturity had been considered when the plants had dropped all leaves, the plants and pods were hard and changed from green to very brown colour. Plant growth and yield parameters were translated to days to emergence (DTE), days to first flower (DTFF), days to 50% flower (DTFPF), days to first pod (DTFP), days to 50% pod (DTFPP), plant height (Pl. Ht), canopy length (CL), number of pods per plant (NOPPP), days to maturity (DTM), weight of seeds per plant (WOSPP), dry matter weight per plant (DMWPP), total seed - grain yield (TGY), total dry matter yield (TDMY). Average of the five plants for each plot was recorded and pooled using statistical mean for the three plots growth and yield parameters. The trial was thoroughly monitored for four months.

Table 1. Mean Effects of 300g of Sheep Organic Manure on physiological growth, grain and fodder yields of improved soybean (TGX-1951-3F) per plot and per hectare

(a) Parameters	(b) Plot 1	(c) Plot 2	(d) Plot 3	(e) $\frac{\Sigma \dot{X}}{n}$	(f) Grain Yield/ Hectare	(g) Dry Matter Yield/Hectare
DTE	5	5	5	5		
DTFF	50	50	49	50		
DTFPF	55	53	55	54		
DTFP	62	61	62	62		
DTFPP	67	66	67	67		
PL.HT/cm	103	104	102	103		
C.L./cm	91	94	93	92.6		
NOFPPP	168	164	166	166		

GYPP /g	40.9	36.4	38.8	38.7		
DTM	115	118	115	116		
WOOG/g	11.7	11.3	11.4	11.4		
DMWPP/g	92.1	89.6	91.2	90.9		
TGY/ha*	-	-	-	-	2.3t*	
TDMY/ha*	-	-	-	-	-	6.07t*

Key: days to emergence (DTE), days to first flower (DTFF), days to 50% flower (DTFPF), days to first pod (DTFP), days to 50% pod (DTFPP), plant height (PL. Ht), canopy length (C.L), number of filled pods per plant (NOFPPP), grain yield per plant(GYPP)days to maturity (DTM), weight of 100 grains (WOOG), dry matter weight per plant (DMWPP), total grain yield/ha (TGY t/ha*), total dry matter yield/ha (TDMY t/ha*).

Table 2. Social and Economic Benefits of 300g sheep organic manure on Soybean to the World Rich and Poor Citizens

S/N	Traits	Rich	Poor
1	Access to large farm land	Not at all a problem	Serious problem
2	Land preparation	Tractor and implements	Manual – hoe, cutlass, animals drawn implements
3	Job opportunity	Very satisfied	Very satisfied
4	Inoculation	Nodumax	Not a priority
5	Planting	Machine – planter	Manual – hoe, cutlass
6	Weeding	Herbicides	Manual – hoe
7	Fertilizer	SUPA or NPK	***Sheep Organic Manure***
8	Pest/diseases	Resistant variety/Insecticides	Resistant variety
9	Harvesting	Machine – combined harvester	Manual – hoe
10	Threshing	Combined harvester	Manual – stick, tray and wind
11	Good clothing	Frequently use	Moderately use
12	Good shelter	Excellent	Moderate
13	Social injustice	Never	Fair
14	Children education	Very possible	Very possible
15	Good health	Very satisfied	Very satisfied
16	Daily Income	Very satisfied	Very satisfied
17	Access to daily healthy nutritious food	Very satisfied	Very satisfied
18	World demand for soybean	Very high	Very high

Fig. 1. Soya cheese (Awara – soybean semi solid flour)

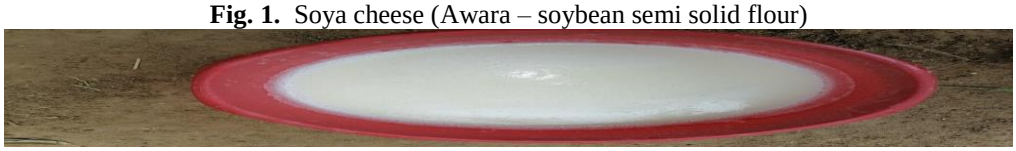

Fig. 2. Soya Milk (extract from soybean semi solid flour)

Fig. 3. Soya Cassava Swallow Food (Eba/Akpu/Fufu – combination of soybean flour and cassava grains/flour)

Fig. 4. Soya Pap Drink- Food (Akamu/Ogi/Koko – combination of soybean flour and maize/millet/sorghum flour)

Fig. 5. Soya Rice Swallow Food (Tuwo Shinkafa – combination of soybean flour and rice grains).

Fig. 6. Soya Yam Swallow Food (Amala – combination of soybean flour and yam flour)

Fig. 7. Soya Vegetables/Okra Soup (combination of soybean flour and Vegetables/okra chip)

Fig. 8. Soya Bread/Doughnut (Combination of soybean flour, plain flour, baking powder, yeast and sugar).

III. RESULTS, DISCUSSION, SUMMARY AND FINDINGS

The soybean pods carried between one to three seeds. Results in table 1coulmns f and g indicated that the application of 19t of sheep manure to the soybean plants produced 2.3t/ha* grain yield* and 6.07t/ha* dry matter*- nutritious feed for sheep and other ruminants. This finding is similar with MWPS-18 (1993) who reported that sheep manure is a natural slow-release fertilizer, and it provides adequate nutrition to the soil. In addition, it enables plants to grow strong roots with good plant production. The grain yield (2.3t/ha), low shattering, excellent grain colour, matures within 3 to 4 months after planting and tolerant to rust, leaf spots and poor soil of the soybean plants (TGX-1951-3F) are consistent with the findings of Omoigui (2020) who reported similar findings. Social and economic benefits of sheep organic manure on soybean farming to the world rich and poor citizens are presented in table 2. Eight healthy and nutritious soybean fortified Nigerian carbohydrate foods are presented in figures 1 to 8. Soya Maize Swallow Food (Tuwo Masara - combination of soybean flour and maize flour, Soya Rice cakes/snacks (Waina/Masa - combination of soybean flour, rice flour, baking powder, yeast and sugar and Soya puff puff (Puff puff- combination of soybean flour, plain flour, baking powder, yeast and sugar are also possible. Oyewole (2018) also reported that households in Iseyin Local Government of Oyo State, Nigeria produced several healthy and nutritious foods from soybean grains. The findings of this trial also agree with Loo (1978), NAERLS (1989) and Fabiyi (2006) who documented health benefits, utilization and processing of raw soybean grains in to variety of healthy and nutritious foods.

IV. RECOMMENDATIONS

1. To create full employment and regular income for World Citizens and to have strong, productive, healthy, free of common diseases, intelligent, happy and zero malnourished World Citizens and Nigerians in particular, Nigeria Presidential Renewed Hope Agenda, Ministries of Women Affairs, Youths, Labour and Employment, Information and National Orientation, Humanitarian Affairs and Poverty Alleviation, Agriculture, Education and Health, National Agency for Food and Drug Administration and Control, Nigerian Medical Association, National Association of Nigeria Nurses, National Council on Nutrition, Nutrition Society of Nigeria, Community Health Practitioners Registration Board of Nigeria (CHPRBN), National Primary Health Care Development Agency (NPHCDA), Vice Chancellors, Provosts, Rectors, Academic Staff Union of Universities, Academic Staff Union of Polytechnics, Colleges of Education Academic Staff Union, Nigeria Television Authority, Bank of Industry, Public and Private Parents Teachers Association, National Association of Nigerian Students, Principals and Headmasters should sincerely encourage sheep organic soybean farming, selling, buying and eating of sheep organic manure soybean fortified carbohydrate foods and soup (figs, 1 to 8) in all Public Ministries, Departments and Agencies and Private Institutions in Nigeria.
2. To reduce youths unrest, poverty and malnutrition in all political constituencies in Nigeria, all Nigerian Governors, Nigerian National and State Assembly Members, should sincerely support youths in their respective constituencies with skills in organic (sheep manure) soybean farming, utilization and processing of organic soybean grains into variety of healthy and nutritious foods.
3. To Reduce Global Poverty and Malnutrition, the trial is presented for United Nations-Food and Agricultural Organization, World Health Organization, World Trade Organization, African Development Bank and World Leaders consideration.

V. CONCLUSION

For the meaningful development of the world economy (healthy workers) and for the prosperity of the world citizens (reliable income), organic (sheep manure) soybean farming is a sustainable enterprise for both the world rich and poor people. Eating sheep organic manure soybean nutritious food/soup/product is essential for your longevity. Sheep Organic Manure Soybean farming or enterprise is less expensive, environmental friendly, helps save money in the long run and your health bills will be significantly lower too.

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