**Proceedings of the Annual Conference of the Agricultural Extension Society of Nigeria**
**Number**: Thirty-First Annual Conference
**Theme**: Strengthening the Agricultural Extension Innovation Systems for Greater Development Impacts
**Date:** 12th to 15th April 2026
**Venue**: Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria
**ISSN**: 1595 – 1421.
**Website**: https://info@ajol.org,
**Email**: agricultural.extension.nigeria@gmail.com; editorinchief@aesonnigeria.org

# Factors Affecting Soybean Production among Farmers in Kwara State, Nigeria

https://dx.doi.org/10.4314/jae.v31i1.52S

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## Abstract

*This study assessed the factors affecting soybean production among farmers in Kwara State, Nigeria. A multistage sampling procedure was used to select 272 soybean farmers for the study. Data were collected using a structured interview schedule and analyzed using frequency, percentage and mean score. Results revealed that the mean soybean yield was 1,032.3 kg/haBayer LL55 (51.2%) was the most commonly cultivated improved seed variety. Data show that the farmers possessed moderate knowledge of improved production practices (67.9%). The leading factors perceived to affect production were migration to urban areas that reduces the availability of farm labor during peak seasons* ($\bar{x}$*=3.95; SD=1.41), limited access to arable land due to restrictive land tenure practices* ($\bar{x}$*=3.92; SD=1.47), and warmer climates contributing to the spread of severe pests and diseases* ($\bar{x}$*=3.75; SD=1.45). Thus, farmers through cooperatives can jointly hire machinery to perform labour-intensive tasks for members. The farmers should also embrace climate-smart practices disseminated by extension agents.*

**Keywords:** Soybean production, influencing factors,

## Introduction

Agriculture in African countries has become the primary means of stimulating economic development, addressing food shortages, and reducing poverty (Ndhlovu, 2025). Most livelihoods in Africa depend on agriculture because, in addition to providing food for humans and animals, it also supplies raw materials for industry (Rege & Sones, 2022). With about 70% of the populace engaged in agricultural activities, as the contributed 27.8% to Nigeria's gross domestic product (GDP) in the first quarter of 2025 (National Bureau of Statistics, 2025). In the crop production sector, soybeans play a crucial role in addressing poverty and food insecurity in sub-Saharan Africa (SSA), including Nigeria, given their status as a multipurpose crop (Oyenpemi et al., 2023).

Soybean (*Glycine max* L. (Merr.) is one of the most important pulse crops belonging to the Fabaceae family. It is among the oldest crops, which has been cultivated since 1700 BC (Bagale, 2021). Globally, soybeans are cultivated in 127.60 million hectares of land, producing about 427.6 million metric tons worldwide in 2025 (United States Department of Agriculture [USDA], 2026). It was introduced to Africa and Nigeria in the 19th century by traders along the east coast of Africa (Aliyu *et al*., 2022). Soybean is the fourth major cereal crop in the world after wheat, maize, and rice

(Grassini *et al*., 2021), in view of its role as a source of vegetable protein, industrial raw materials, and raw materials of livestock (Hamza *et al*., 2024). Though soybeans are cultivated in all states of Nigeria, it is mainly grown in North-Central Nigeria. Common varieties grown include: TGX1448-2E, TGX1904-6F, TGX1830-2E, and TGX1485-2E-ID (James et al., 2022).

Soybeans have multiple uses. It is considered a wonder crop, and none of the soybean byproducts remains unused. Its nutritive values have been considered utmost as it contains protein (37%–48%) and oil (16%–21%), making it richer than any common vegetable or animal food sources (Qin et al., 2022; Baisch et al., 2024). Soybean cake is a valuable livestock feed, particularly for poultry, while the haulms are a suitable feed for goats and sheep (Toomer et al., 2024). In addition, soybeans are used in industries for making wood veneer, paper coatings, printing ink, adhesive, and alkyd resins, etc. Moreover, soy milk, soy cheese, soy flour, and dadawa are made from soybeans (Fasusi et al., 2022).

Soybean (Glycine max) has gained increasing importance due to its nutritional value, industrial uses, and its ability to improve soil fertility through nitrogen fixation. Despite the economic and agronomic significance of soybeans, production in Nigeria, particularly in Kwara State, has not reached its full potential (Oyenpemi et al., 2023). This is especially true among farmers who form the backbone of the country's agricultural sector. Farmers in Kwara State seem to be facing ~~a~~ myriad of challenges that hinder optimal soybean production. These challenges could range from limited access to inputs such as quality seeds, fertilizers, and agrochemicals, to inadequate extension services and poor market linkages (Ikuemonisan et al., 2024). In addition, environmental factors such as erratic rainfall, soil degradation, and pest infestations further compound the difficulties encountered by the farmers. Socioeconomic factors, including limited access to credit and land tenure issues, also played a significant role in limiting productivity (Lyocks et al., 2025).

While a recent study has examined the economic performance of smallholder soya bean production in Kwara State, Nigeria (Oyenpemi et al., 2023), no study has investigated the perception of farmers on the factors affecting soybean production in Kwara State. Thus, this study assessed the factors affecting soybean production among farmers in Kwara State, Nigeria. The specific objectives of the study were to: (i) identify the soybean varieties cultivated by farmers; (ii) examine farmers' knowledge of best agronomic practices for soybean production, and (iii) identify the farmers' challenges in soybean production.

## Methodology

The study was carried out in Kwara State, Nigeria. The state was created by the Federal Government in May 1967. Kwara State is located on a latitude $8^0$30' and $8^0$50'N and longitude $4^0$20' and $4^0$35'E of the equator and shares boundaries with Niger State in the north, Kogi State in the east, Oyo, Ekiti, and Osun States in the south, and an international boundary with the Republic of Benin in the west (Olatinwo et al., 2024). The population of Kwara was about 2,365,353as at the 2006 census, with 2.6% annual population growth rate in Nigeria. Kwara State's projected population should be 3,551,000 people in the year 2022 (NBS, 2022).

A multistage sampling procedure was employed to select respondents for the study. Stage one involved the purposive selection of two LGAs in Kwara North based on their high soybean production. The selected LGAs are Baruten and Kaiama. Stage two involved the purposive selection of 5 communities in each LGA with the highest soybean production activities, giving a total of 10 communities for the study. The third stage was a proportionate random selection of 30% of the soybean farmer population (907) across two LGAs, yielding a sample size of 272 respondents. The summary of sampled respondents per community is presented in Table 1.

**Table 1: Summary of sampling procedure**

| LGAs | Communities | Population | Sampled 30% |
|---|---|---|---|
| Baruten | Okuta | 110 | 33 |
| | Yashikira | 67 | 20 |
| | Kosubosu | 70 | 21 |
| | Chikanda | 153 | 46 |
| | MoshiKpeku | 67 | 20 |
| Kaiama | Kaiama | 70 | 21 |
| | Kani Koko | 97 | 29 |
| | Kemenji | 80 | 24 |
| | Venra | 90 | 27 |
| | Degeji | 103 | 31 |
| **Total** | | **907** | **272** |

A structured interview schedule addressing the specific objectives was designed to collect primary data. The instrument was checked by 6 experts in the Department of Agricultural Extension and Rural Development, University of Ilorin, Kwara State, to ensure its content validity.

Varieties of soybean seeds cultivated by farmers were measured using yes=1 and no=0. Farmers' knowledge of best agronomic production practice was measured as true, I know (1) or False, I don't know (0). The aggregate score of each respondent was used to generate the knowledge level. Scores from 0 – 11 were considered as low knowledge, scores between 12 and 23 were grouped as moderate knowledge, while scores from 24 to 34 were grouped as high knowledge. Perceived factors affecting soybean production were measured using a 5-point Likert scale as strongly agree=5, agree=4, undecided=3, disagree=2, strongly disagree=1. Factors with a mean value of 3.0 and above were considered significant. Data gathered from the field survey were analysed using frequency, percentage, and mean score.

## Results and Discussion

### Varieties of Soybean Seeds Cultivated by Farmers

Table 2 shows varieties of soybean seeds cultivated by farmers. The results showed that Kano Kano (62.1%), TGx 1448-2E (53.4%), and Samsoy-2 (46.0%) were ranked first, second, and third, respectively, among the local varieties cultivated by the respondents in the study area. This implies that the striving local varieties still serve the farmers in terms of production, compatibility with local norms, and acceptability by people in the study area. Findings conform to the report by Tafida et al. (2022),

which indicated the prevalence of local variety cultivation along with improved soybean varieties in Kano State.

Results on improved varieties indicated that Bayer LL55 (51.2%), Syngenta NK S45-K6 (48.9%), and AsgrownA3237 (44.6%) were rated first, second, and third types of improved soybean varieties cultivated by the respondents. While farmers grow these improved varieties, they do not neglect indigenous agricultural practices in cultivating local varieties alongside the improved varieties. This report is in line with the findings of Fasusi et al. (2022), which indicated that the introduction of technology could make rural dwellers neglect indigenous practices in farming in Nigeria.

**Table 2: Varieties of seeds cultivated by farmers**

| Seed Varieties | Percent |
|---|---|
| **Local Varieties** | |
| Kano Kano | 62.1 |
| TGx 1485-1D | 41.7 |
| TGx 1448-2E | 53.4 |
| Samsoy-1 | 38.9 |
| Jenguma | 39.2 |
| Samsoy-2 | 46.0 |
| **Improved Varieties** | |
| Pioneer 9832 | 38.6 |
| Monsanto RR2Y | 41.4 |
| Syngenta NK S45-K6 | 48.9 |
| Bayer LL55 | 51.2 |
| AsgrownA3237 | 44.6 |

*Source: Field survey, 2025.*

**Farmers' Knowledge of Best Agronomic Practices for Soybean Production**

As shown in Table 3, the leading agronomic practices adopted by the respondents were avoidance of waterlogged areas in site selection (69.8%). This shows that the farmers are aware of the soil water content required for growing soybeans. During land preparation, the farmers mainly plough and harrow the land to create a fine till (67.5%) not suitable for planting. Also, the seed selected by the farmers is mainly selected based on a high germination rate above 80% (66.4%), while high-quality, disease-resistant, and high-yielding soybean seed varieties (47.2%) were less prioritized by the farmers. This implies that the local or improved varieties factor is less important than the germination rate. Other highly applied agronomic practices were the use of practice manual weeding by hoeing (67.5%), use of integrated pest management (IPM) practices (74.3%), crop rotate of soybeans with cereals (64.5%), use of manual or mechanical methods for harvesting (78.5%), and use airtight containers or storage bags to protect against pests and humidity (68.7%). These findings revealed a mixed local, improved, and sustainable agricultural practice for growing soybeans in the study area.

**Table 3: Respondents' knowledge response on best agronomic production practices**

| Description of Agronomic Practices | Knowledge True (%) |
|---|---|
| Selecting sites with well-drained, fertile soils with a PH of 6.0 to 7.0 that is good for soybean production | 61.3 |
| Avoiding waterlogged site | 69.8 |
| Recognising a site with adequate sunlight exposure. | 27.5 |
| Clearing the field of weeds, stumps, and other debris. | 63.4 |
| Ploughing and harrowing the land to create a fine tilt | 67.5 |
| Practicing minimum tillage in regions prone to soil erosion. | 58.1 |
| Choosing high-quality, disease-resistant, and high-yielding soybean seed varieties unsuitable for the region. | 47.2 |
| Recognizing seeds with a high germination rate (above 80%). | 66.4 |
| Treating seeds with a fungicide or insecticide to protect against soil-borne diseases and pests. | 50.6 |
| Not inoculating soybean seeds with rhizobium bacteria if the soil lacks a history of soybean cultivation. This promotes nitrogen fixation and enhances crop growth. | 41.1 |
| Planting at any time of the rainy season, even when moisture conditions are not adequate. | 37.4 |
| Maintaining a planting spacing of 40-60 cm between rows and 5-10 cm between plants within rows ensures maximum performance | 8.0 |
| Using a seeding rate below 40-60 kg per hectare, depending on seed size and planting method. | 36.2 |
| Conducting a soil test to determine nutrient need not necessary | 36.6 |
| Applying phosphorus and potassium fertilizers based on soil test results (e.g., 20-40 kg P2O5 and 40-60 kg K2O per hectare). | 39.2 |
| Using organic fertilizers like compost or manure to improve soil structure and fertility. | 32.1 |
| Applying excess nitrogen, as soybeans cannot fix their own nitrogen through nodulation. | 57.7 |
| Keeping the field with weeds during the first 4-6 weeks after planting, as this is the critical growth period. | 46.6 |
| Practicing manual weeding, hoeing, or the use of selective herbicides. | 67.5 |
| Avoid mulching to suppress weed growth and retain soil moisture. | 69.8 |
| Monitoring crops regularly for signs of pests and diseases, such as aphids, leafhoppers, rust, and root rot. | 65.7 |
| Avoiding appropriate pesticides and fungicides when infestations exceed economic thresholds. | 56.2 |
| Using integrated pest management (IPM) practices to reduce chemical use. | 74.3 |
| Providing supplemental irrigation during dry spells, especially during flowering and pod-filling stages. | 66.0 |
| Doing proper drainage to prevent waterlogging is not a good practice | 33.2 |
| Rotating soybeans with cereals (e.g., maize, sorghum) or other non-leguminous crops to break pest and disease cycles and improve soil health. | 64.5 |
| Delay soybean harvest when 90-95% of the pods have turned brown and the seeds are hard and dry. | 43.4 |
| Avoiding harvesting too early, as this can lead to immature seeds, or too late, which can cause shattering losses. | 58.5 |
| Using manual or mechanical methods for harvesting. | 78.5 |
| Drying harvested soybean seeds to a moisture content of 12-14% to prevent spoilage. | 39.6 |
| Storing seeds in cool, dry, and well-moistened conditions. | 24.2 |
| Using airtight containers or storage bags to protect against pests and humidity | 68.7 |

*Source: Field survey, 2025*

## Level of Knowledge of Soybean Production Practices

Table 4 shows that a greater proportion (67.9%) of the soybean farmers had a moderate knowledge level of best agronomic production practices, followed by 29.8% with a high knowledge level, and very few (2.3%) had a low knowledge level. This implies that the soybean farmers had moderate knowledge of agronomic production practices for soybean production. This finding agrees with studies that earlier reported moderate knowledge of sustainable agronomic practices among arable crop farmers (Pelemo et al., 2024; Okonta et al., 2023).

**Table 4: Level of knowledge of soybean production practices**

| Obtained knowledge score | Level of knowledge | Frequency | Percentage | Mean | SD |
|---|---|---|---|---|---|
| 0 – 11 | Low | 6 | 2.3 | | |
| 12 – 23 | Moderate | 180 | 67.9 | 21.6 | 3.52 |
| 24 – 34 | High | 79 | 29.8 | | |

## Perceived Factors Affecting Soybean Production among Farmers

Results presented in Table 5 showed that most of the challenge variables indicated mean values above the 3.0 average benchmark of the scale, indicating that the challenges were highly severe in affecting soybean production in the study area. The topmost challenges indicated were migration to urban areas reduces the availability of farm labor during peak seasons ($\bar{x}$=3.95; SD=1.41), farmers often have limited access to arable land due to restrictive land tenure practices ($\bar{x}$=3.92; SD=1.47), warmer climates contribute to the spread and severity of pests and diseases ($\bar{x}$=3.75; SD=1.45), inconsistent and inadequate rainfall ($\bar{x}$=3.71; SD=1.48), inadequate access to timely agricultural extension services to learn best practices for soybean cultivation ($\bar{x}$=3.67; SD=1.47), and changes in rainfall patterns and temperature extremes ($\bar{x}$=3.62; SD=1.51). Findings imply that soybean farmers in the study area are facing multidimensional challenges that hinder the effective cultivation of soybeans. These confirm the report by Fasusi et al. (2022), who similarly indicated that factors leading to low yield for commercial soybean production in Nigeria include the impact of climate change, poor soil fertility and nutrient depletion, the high emergence of pests and diseases, and limited improved soybean cultivars. More studies had previously reported a lack of access to land (Odozi & Uwaifo, 2024; Lyocks et al., 2025; Edafe et al., 2023), and climate change (Otwe, 2024) as factors negatively affecting cereal/grain crop production in Nigeria.

Only a response on inadequate weed control during the critical growth stages can result in severe competition for nutrients and light ($\bar{x}$=2.97; SD=1.44), which was below the benchmark of 3.0. This finding presents weed control measures as not a factor affecting soybean production in the study area. Earlier findings on agronomic practices have revealed the use of hoe/manual weeding as the main weed control measure. Even though this method is local and may be favourable for commercial production, the farmers still consider less severe factors affecting them. This could imply the satisfactory state of use of manual implements for weed control among the farmers.

**Table 5: Perceived factors affecting soybean production.**

| Challenges to soybean production | Mean | SD |
|---|---|---|
| Inconsistent or inadequate rainfall | 3.71 | 1.48 |
| High temperatures, especially during pod formation reduce yields and seed quality. | 3.50 | 1.47 |
| Prolonged dry spells can lead to drought | 3.37 | 1.46 |
| Limited access to fertile soil. | 3.43 | 1.45 |
| Soil degradation, reducing its productivity. | 3.27 | 1.52 |
| Inadequate access to high-yielding and disease-resistant soybean varieties. | 3.32 | 1.47 |
| Unavailability and unaffordability of fertilizers. | 3.27 | 1.47 |
| Inadequate access to effective agrochemicals including pesticides | 3.27 | 2.82 |
| Infestation of pests (such as aphids, stem borers, and pod borers). | 3.13 | 1.63 |
| Infestation of fungal diseases (such as rust and bacterial blight). | 3.47 | 1.56 |
| Inadequate knowledge on weed control measure during the critical growth stages. | 2.97 | 1.44 |
| High cost of labor. | 3.45 | 1.55 |
| Limited availability of tractors and other agricultural machinery. | 3.19 | 1.59 |
| Inadequate post-harvest storage infrastructure | 3.17 | 1.56 |
| Inadequate access to timely agricultural extension services to learn best practices for soybean cultivation. | 3.67 | 1.47 |
| Poor farmer education on soil management, pest control, and seed selection negatively impacts productivity. | 3.21 | 1.59 |
| Limited access to credit facilities | 3.35 | 1.53 |
| Inadequate market linkages for farmers to sell soybean produce. | 3.37 | 1.55 |
| Poor farm road networks. | 3.29 | 1.54 |
| Instability in soybean prices discourages investments in production. | 3.40 | 1.55 |
| Limited soybean processing facilities reduce demand, leading to market saturation in peak harvest seasons. | 3.42 | 1.45 |
| Insufficient government support in the form of subsidies for fertilizers, seeds, and machinery. | 3.56 | 1.40 |
| Changes in rainfall patterns and temperature extremes affecting productivity. | 3.62 | 1.51 |
| Warmer climates contribute to the spread and severity of pests and diseases. | 3.75 | 1.45 |
| Limited access to arable land due to restrictive land tenure practices. | 3.92 | 1.47 |
| Migration to urban areas reduces the availability of farm labor during peak seasons. | 3.95 | 1.41 |

Source: Field survey, 2025 mean cut-off=3.0

## Conclusion and Recommendations

Based on the findings, it can be concluded that the farmers planted both local and hybrid soybean varieties. However, Kano-kano was mainly cultivated among the local seed varieties, while Bayer LL55 was mainly cultivated among the hybrids. Furthermore, rural-urban migration leading to inadequate access to hired labour, limited access to land for soybean farming, detrimental effects of climate change on soybean farms, and the severity of pest and disease infestation were perceived as the foremost factors affecting soybean production among the farmers in the study area. Therefore, deliberate agricultural extension programmes and policies are

needed to solve the problem of rural-urban migration, limited access to land for soybean farming, climate change effects on soybean farms, as well as pest and disease infestations among soybean farmers.

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