PERCEIVED EFFECT OF AGROFORESTRY ON AGRICULTURAL LIVELIHOODS AND THE FARM OUTPUT OF RURAL SMALLHOLDER FARMERS IN IMO STATE, NIGERIA

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ABSTRACT

The present study assessed the perceived effect of agroforestry on Agricultural livelihood and the farm output of rural smallholder farmers in Imo state, Nigeria. This investigation identifies the agroforestry practices farmers are involved in, the constraints to agroforestry practices in the study area as perceived by smallholder farmers and ascertain perceived effects of agroforestry on rural household livelihood and output in the area. A total of 270 farmers were selected through multi stage sampling techniques. A questionnaire was employed to collect data from the farmers, which was then analyzed using percentages and presented in frequency tables, along with mean and standard deviation and analysis of variance (ANOVA). The findings indicated that farmers are involved in agroforestry practices agro-horticulture (planting fruit trees or other perennial crops with annual crops) (74.1%), Improve crop fallow (leaving crops or shrubs in natural fallows in order to improve soil) (72.2%), agro-silviculture (growing trees with crops) (65.9%). The identified constraint to agroforestry practice lack of land security, lack of processing machineries and control over land. The result also showed that the effect of agroforestry on agricultural livelihood and farm out of smallholder farmers was high with a grand mean of 2.95. Rural farmers do not differ in the perceived effects of agroforestry on their agricultural livelihood and farm output of farmers in the 3 agricultural zones of Owerri, Orlu and Okigwe of Imo State.

Keywords: *Agriculture, agroforestry, livelihood, farm output; productivity.*

INTRODUCTION

Agroforestry is a collective name for land-use systems and technologies where woody perennials are deliberately used on the same land management units as agricultural crops and /or animals in some form of spatial arrangement or temporal sequence, currently practiced by over 1.2 billion people worldwide emerges as the best placed towards achieving sustainable agriculture and food security (FAO, 2020). The country's agroforestry production primarily remains an important sector among small-scale farmers to ensure food security and alleviate poverty and improve farmers' livelihood. The acceptance of agroforestry as a system of land management is attributed to increasing spread of tropical deforestation and ecological degradation, shortages of fertilizers and re-awakening of scientific interest in the farming systems since it increase species diversity within farming systems, providing for human needs while supporting wildlife, soil microorganisms, rural communities, economic interests, watersheds, clear air, biodiversity and

more (Elevitch, and Ragone, 2018). The integration of trees and shrubs into agricultural landscapes, fosters a stable synergy between crop production, tree production, and conservation of the environment. According to Satish et al., (2020), The blending of agricultural and forestry practices not only enhances the productivity and resilience of farming systems but also offers a plethora of ecological, economic, and social benefits.

Agroforestry offers enormous economic benefit, economic opportunities for farmers, ecological advantages, agroforestry also presents compelling, including diversified income streams, increased crop yields, and reduced production costs (Nwozuzu, Ukpongson, Ejiogu, Chijioke & Onyejiuwa, 2021). It remains a viable cornerstone capable of ensuring agricultural innovation, better productivity, and end ensuring harmonious landscapes that benefit both people and the planet. Sekhar et al., (2024), noted that agroforestry contributes to social well-being by supporting rural livelihoods, strengthening community resilience, and preserving cultural heritage.

Many agroforestry systems in the world integrate various intensities of traditional agricultural practices in combination with modern assessable low-cost technologies and know-how. These subcategories include agro-silviculture (growing trees with crops), agrosilvopastrure (growing trees with pasture), agro-horticulture, shifting cultivation and home gardens which manage trees, crops and animals (Seneviratne, Sumanasekara, .& Dissanayake., 2015).

Through agroforestry, the integration of trees with crops and/or livestock, is crucial for sustainable agriculture and environmental health. It offers a multitude of benefits, including improved soil fertility and soil health, increased biodiversity, enhanced economic state of farmers and enhanced resilience to climate change, making it a valuable practice for both farmers and the environment.

Expanding on the soil health addition through agroforestry: it's essential to recognize the profound impact of agroforestry towards agriculture through Soil Nutrient Cycling. Soil nutrient cycling refers to the continuous movement and exchange of essential chemical elements (nutrients) between living organisms (biotic) and the non-living components of the soil (abiotic). This process is vital for maintaining soil fertility and supporting plant growth by ensuring a constant supply of nutrients. Through Agroforestry, trees can fix nitrogen in the soil, reducing the need for synthetic fertilizers. This is because certain trees form symbiotic relationships with nitrogen-fixing bacteria in their roots, converting atmospheric nitrogen into a usable form for plants. According to Nwozuzu et al., (2021), this natural process helps enrich the soil with nitrogen, improve soil performance, enhance plant growth, thereby benefiting not only the trees themselves but also surrounding plants. Agroforestry also offers reduced reliance on synthetic fertilizers through nitrogen fixation, trees can help decrease the need for farmers to apply synthetic nitrogen fertilizers, which can be costly and have negative environmental impacts.

Expanding on the increased biodiversity intensification: Agroforestry offers diverse habitats for various species of birds, insects, and other animals. The presence of trees, shrubs, and understory vegetation creates vertical and horizontal heterogeneity, providing niches for various organisms to thrive (Reddy et al., 2024). The structural complication of agroforestry landscapes provides habitat and food resources for a wide range of wildlife species. Birds, bats, and insects find shelter, nesting sites, and food sources among the diverse vegetation layers, contributing to the conservation of biodiversity in agricultural

areas. This, in turn, can have adverse effects on ecosystem functioning, such as seed dispersal and nutrient cycling, which are essential for maintaining ecosystem health and resilience.

Expanding on enhanced economic state of farmers: Agroforestry provides multiple income streams from different products, such as timber, fruits, nuts, and fodder. Also through reduced reliance on external inputs can lower production costs, thereby leading to higher crop yields due to improved soil fertility and microclimate conditions. It is also important to note that agroforestry offers diverse income sources of farmers, profitability and reliance on their farming enterprises thereby offering additional revenue streams through the Timber production, Fruit and nut Production and Medicinal Plants and NTFPs and diverse array of products and services they offer.

Expanding on the enhanced resilience to climate change: Agroforestry systems can help stabilize slopes and to reduce soil erosion, protecting valuable topsoil and nutrient runoff, leading to cleaner water sources. Through agroforestry, trees aid in reducing temperature extremes and can act as windbreaks, protecting crops and livestock from strong wind effects.

GENERAL AND SPECIFIC OBJECTIVES OF THIS RESEARCH

This research aims to explore how agroforestry affects agricultural livelihood activities and farm productivity from the perspective of farmers. It is anticipated that the findings of this study will provide insights on agroforestry potentials considering its enormous contribution into the state of food security and livelihood of farmers. Such data may be valuable for the government, NGOs, and international organizations in their planning for reconstruction efforts. The specific goals were to identify various agroforestry practices smallholder farmers are involved in the study area, analyze the constraints to agroforestry practices in the study area as perceived by smallholder farmers and ascertain perceived effects of agroforestry on rural household livelihood and output in the area.

Hypothesis states that: smallholder farmers do not differ significantly in their perceived effects of agroforestry on their agricultural livelihoods and farm output in the three agricultural zones of Imo.

METHODOLOGY

The study was conducted in Imo State, Nigeria. Imo state was created on February 3, 1976. It is located in the South East zone of Nigeria and it lies between latitude 4° 45'N and 7° 15'N and longitude 6° 50'E and 7° 25'E with land area of 5,530Km2 , and an estimated population of about 4.8 million people and an annual growth rate of 3.35 percent (NPC, 2011). It is bordered by Abia state on the East, by River Niger and Delta state on the East, River Niger and Delta State to the West, Anambra State on the North and Rivers State to the South (Wikipedia, updated). Imo state has a total number of 27 local government areas, with a high population density which exceeds that of the annual average of 166 persons per kilometer square (www. imostate.gov.ng). The population density of the State varies from 230 persons per kilometer square in Egbema area to about 1400 persons per kilometer square in Mbaise, Mbano, Orlu and Mbaitoli area (Federal republic of Nigeria Gazette, 2017). Moreover, a greater percentage of the population lives in the rural area and they are farmers. Imo state lies within the rainforest zone Nigeria and has a large forest vegetation containing woods and tree crops (both for timber and the like) such as mahogany, iroko, obeche, palm trees, oil bean trees, Gmelina trees, bamboo, rubber tree, fruit trees such as mango, orange, avocado pear etc. and other tree crops that complement farmers income source. Imo state belong to Benin formation of the coastal plain sand which is of tertiary age, deep, porous, fertile and highly leached. Drained by Imo River, Otamiri river,

Nworie river, Njaba and Urashi rivers, the annual rainfall of imo state varies from 1,500mm-2,200mm (60-80 inches) with about 200 ° (68.00 °) annual temperature and 75 percent annual relative humidity (the humidity reaching 90% in rainy season) (www.imostate.gov.ng)

The major religion, and their major economic activity includes the following: farming, trading, agro processing and other non-agricultural practices. The major crops grown by the people are banana, yam, cocoyam, maize, rice, leafy vegetables, melon, palm oil, etc. The state is also endowed with mineral resources like crude oil, natural gas, lead, zinc, aluminum.

Imo state is divided into three agricultural zones of Owerri, Orlu, and Okigwe. Rural farmers constitute the majority of the farmers in the state; this could be as a result of the increasing male out-migration common in many rural areas (Orisakwe, 2011). They are also largely involved in the production of such animals as local chicken, goats and sheep (Nwozuzu et al., 2024).

SAMPLING PROCEDURE AND DATA COLLECTION

A three-stage sampling method was employed to select participants. The initial stage involved purposively identifying the three Local Government Areas (LGAs) in Imo State actively involved in Agroforestry. The locations include Mbaitoli, Oru East, Isiala Mbano. Three communities were intentionally selected from each LGA. From Mbaitoli, we selected Ifakala, Alaenyi Ogwa, Afara. In Oru East, we selected Amagu, Amiri, Ofekata, Eleh. In Isiala Mbano, we selected Anara, Ibeme, Amuzi, resulting in a total of nine communities. Lastly, in the third stage 30 rural smallholder farmers were ramdomly selected from each village to give a total sample size of 270 farmers. Primary data for this study was collected through a structured questionnaire and oral interviews. The data was analyzed using percentages, means, and standard deviations. Objectives 1, were fulfilled through the use of percentages displayed in frequency tables. Objective 2 and 3, concerning constraints to agroforestry practices in the study area as perceived by smallholder farmers and perceived effects of agroforestry on rural household output in the area, was evaluated using a four-point Likert type scale with responses categorized as strongly agree, agree, disagree, and strongly disagree, which were assigned weights of 4, 3, 2, and 1 respectively. The total values were summed and divided by 4 to determine the discriminating mean value of 2.50. Any mean value equal to or above 2.50 was considered to have effect.

This is mathematically represented as

$$\frac{S.A+A+D+S.D}{N} = \frac{4+3+2+1}{4} = \frac{10}{4} = 2.5$$

Test for Hypothesis was analyzed using ANOVA, that is, Analysis of variance, expressed as follows:

$$= \frac{*}{*} = \frac{(- \#)}{(\# - !)} \qquad \sigma$$

$$^{-} \qquad = \quad [-]^2$$

$$_{-} \qquad = \quad _{=1} \quad _{=1}(\quad - \quad)^2 \qquad \sigma \qquad \sigma$$

Source: Kim (2015)

Where;

F = the value from which the statistical mean was judged.
SSB = Sum of squared deviations between the mean perception of the smallholder farmers's level of involvement in agroforestry practice and their livelihood in the three agricultural zone.

SSW = Sum of squared deviations within the mean perception of smallholder farmers level of involvement in agroforestry practices and the benefit in their livelihood in the three agricultural zone.

X = grand mean of the smallholder involvement in agroforestry in the three agricultural zones

X_{ij}= nth level of rural farmer‘s involvement in agroforestry from agricultural zone j.

n_j = sample size of the respondent from Agricultural zone j

n= number of observations from the three agricultural zone

k= number of agricultural zones in the state.

RESULTS AND DISCUSSION

These are the various agroforestry practices crucial for everyday living carried out by smallholder farmers in the study area. The practices include Alley Cropping (Intercropping of food crops and woody species in the same land (55.6%), wood splitting (32.2%), agro-silviculture (growing trees with crops) (65.9%), agrosilvopastrure (growing trees with pasture) (33.7%), agro-horticulture (planting fruit trees or other perennial crops with annual crops) (74.1%), Riparian Forest Buffers (integrating strips of trees and shrubs along waterways to protect water quality) (14.8%), Windbreaks (Planting rows of trees and shrubs to reduce wind speed, protect crops, and prevent soil erosion) (44.8%), Forest Farming (Cultivating shade-tolerant plants under the forest canopy, such as medicinal herbs or specialty crops.) (25.6%), Taungya system (cultivation of annual crop among young trees) (53.7%), Improve crop fallow (leaving crops or shrubs in natural fallows in order to improve soil) (72.2%). These activities represent ways to earn a livelihood as indicated by rural farmers, it encompass the farmers ability, skill and daily incoming generating ventures engaged by farmers for meeting life's basic needs. The quest to engage in livelihood activities indicates that livelihood involves obtaining food, shelter, clothing and other vital and essential demands for survival at both household and individual levels. The result agrees with the finding of Nwozuzu *et al.,* (2021) who noted that majority of rural farming households are involved in agroforestry farming related activities because it has the ability to meet their family food needs. He further noted that agroforestry can be viewed as one to such societal response, primarily born out of a need to fulfill immediate basic human needs of food, fuel, fodder, shelter, protection etc. The result also agree with the findings of Gowland-Mwangi and Maina (2013), who noted that agroforestry practice is intended to serve the purpose of providing sources of food, source of income for the farmer, improve farm output, as well as providing minimum cover for nursery seedlings and mitigation of evapo-transpiration. Furthermore, Ukpe *et al.,* (2009) added that the reason behind of growing of trees, shrubs and herbaceous plant as well as planting trees in plantation and arable crops is inspired by the revenue potentials of such activities. By earning money through the aforementioned, the farmers are able to meet their other basic needs like payment of healthcare services, clothing, education, social amenities, housing, food, etc.

Table 1: Agroforestry practices engaged in by smallholder farmers

Agroforestry practices	*Frequency	Percentage
Alley Cropping	150	55.6
Wood Splitting	87	32.2
Agro-silviculture (growing trees with crops)	178	65.9
Agro-silvopastrure (growing trees with pasture)	91	33.7
Agro-horticulture (planting fruit trees or other perennial crops with annual crops)	200	74.1
Riparian Forest Buffers (planting trees and shrubs along waterways)	40	14.8
Windbreaks (trees and shrubs to reduce wind speed, protect crops, soil erosion)	121	44.8
Forest Farming (Cultivating shade-tolerant plants under the forest canopy)	69	25.6
Taungya system (cultivation of annual crop among young trees)	145	53.7
Improve crop fallow (leaving crops or shrubs in order to improve soil)	195	72.2

Source: Field survey data, 2019

*Multiple responses recorded

Constraints to agroforestry practices in the study area as perceived by smallholder farmers

The result revealed constraints to agroforestry practices in the study area as perceived by smallholder farmers, items investigated were indicated by farmers as constraints to agroforestry practice in the study area. The constraints were further ranked in order of decreasing severity. The ranking revealed that land security was the major constraint to agroforestry practice in the area (1st) with a mean score of 3.2, this was followed by lack of processing machineries (2nd). While lack of control over land was rated third. High cost of farm inputs, lack of production materials, unfavorable agriculture policies, lack of incentives, high cost of establishment of agroforestry and high incidence of bush fire were ranked fourth. Poor marketing information and systems occupied the 11th position while theft, poor financial base, poor government policy support and incidence of pest attacks ranked 12th. Others include lack of labor, high mortality of tree seedling and inadequate extension service which ranked 16th, while the least rated constraint was long gestation period to reap benefits of agroforestry.

This results strongly confirms the earlier findings of Ukpe et al., (2009) which found land security as a major challenge to agroforestry, agricultural livelihood activities of farmers and farm output. He noted that the rapid degradation of the rural environment has led to dwindling supplies of agroforestry resources and farm output which ultimately leads to dwindling income of smallholder farmers. Where land is not cyclic, unemployment and secured agroforestry resources become vulnerable to unlawful activities like setting of fire in forest, land encroachment, human population poaching, climate changes, among others which affects the output of smallholder farmers (Ukpe et al., 2009).

On the problem of lack of processing machines, Memon, Devrajani, Tagar and Yongjun (2024) noted that most machines for harnessing forest resources are capital intensive and beyond the

reach of farmers to effective engage in agrarian production and processing. This is manifest in wood processing which is completely dominated by wealthy merchants who process forest woods into industrial logs and ship to foreign markets. Some of the referred expensive machineries include limbering machines, wood shaping machine, and wood priming machine, crane and trucks for transporting wood products.

In terms of land control, rural smallholder farmers are usually faced with lack of control to ownership and use of lands (Madu, 2014). This practice limits the productivity of rural farmers in agroforestry, and consequently subjugate them to poverty. Further in his comments on other problems that limit farmers participation in agricultural livelihood activity such as agroforestry, he noted that issues like high cost of input, high cost of production materials, poor government policy, high cost of establishing agroforestry are common placed. It is in this light that Nwachukwu (2018) recommended effective agricultural subsidy regime to be implemented by government at all levels, ranging from Federal to local government levels. Through input subsidy farmers can afford improved technologies hitherto beyond their reach. The efficacy of this approach is witnessed in the mechanism of the Growth Enhancement

Support Scheme (GESS) of the previous government in which input such as quality fertilizer, seeds and cuttings were supplied to farmers at affordable prices (Federal Ministry of Agriculture and Rural Development (FMARD), 2011). These measures are implemented through the framework of government policies as in the case of which GESS was encapsulated in the Agricultural Transformation Agenda (ATA) policy of the Federal government. Through effective policy pertinent issues such as mentioned earlier undermining agricultural production are identified and effectively addressed.

Similarly, the challenge of poor marketing information, theft, pests and disease attack, lack of labour, high mortality and inadequate extension services have remained policy making matters (FMARD, 2011). The report asserted that with a well formulated policy tailored to help farmers meet their information needs such as through funding TV/radio farmer programmes, provision of pests control centers across different locations, increased agroforestry development activities to generate new jobs, implementation of value chain extension service delivery.

The grand mean was 2.79. This was above the discriminating index of 2.5. This implies that the rural smallholder farmers in the state experienced the above listed constraints as deterring factors towards the attainment of household food needs and also considered as a limitation to the attainment of agricultural farm output.

The standard deviation value of the farmers perception ranged from 0.2 – 1.4. The standard deviation score of high cost of farm inputs (0.5), lack of interest by farmers (0.5), high cost of establishment (0.5), lack of control over land (0.6), lack of materials (0.6), lack of incentives (0.6), lack of labour (0.6), long gestation period to reap the benefits of agroforestry (0.7), poor and inadequate extension service (0.7), poor financial base (0.7), incidence of pest (0.8), theft (0.8), poor government policy (0.9) were in unity. There was harmony in the response by the farmers. The other items were not in unity in the responses by the rural farmers, indicating that the farmers harbored different opinions regarding what constrained agroforestry practices towards attaining food security of rural rural farming households.

Table 2: Constraints to agroforestry practices

Perceived Constraints	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	SD
Land Security	82	129	41	7	3.2*	0.2
Lack of control over land	78	134	37	10	3.0*	0.6
Long gestation period to reap the benefits of Agroforestry	50	51	48	9	2.4	0.7
High cost of Farm inputs	80	133	37	9	2.9*	0.5
Lack of production materials	67	100	81	9	2.7*	0.6
Unfavorable agricultural policies	84	119	44	11	2.9*	0.7
Lack of incentives	86	116	44	13	2.9*	0.6
Poor and inadequate extension service	53	103	88	13	2.6*	0.7
Lack of interest by farmers	64	93	82	19	2.7*	0.5
Incidence of pest attacks	80	118	49	12	2.9*	0.8
Theft	63	96	82	16	2.7*	0.8
Poor marketing information and system	71	97	81	8	2.8*	1.3
Lack of processing machineries	109	103	39	8	3.1*	1.4
Low awareness of agroforestry practice	58	100	77	24	2.6*	0.3
High mortality of tree seedling	55	95	83	26	2.6*	0.4
High cost of establishment	73	121	54	12	2.9*	0.5
Lack of labour	55	95	84	25	2.6*	0.6
High incidence of bush fire	73	121	54	12	2.9*	0.2
Poor financial base	72	99	58	31	2.7*	0.7
Poor government policy support	65	127	49	15	2.7*	0.9

Source: Field survey data.

Perceived effects of agroforestry on rural household livelihood and output in the area. The result in table 3.3 addressed the effects of agroforestry on the livelihood and output of farmers in Imo state. Based on 2.5 discrimination index established from a point likert type scale, the result indicated that agroforestry affected the rural households in all the ten-food security effect indicator used in this study. Precisely, agroforestry provided vegetable rich in calcium ($\bar{x}$=3.2%), fuel wood for cooking (3.1), adequate edible fruit ($\bar{x}$=3.0) medicinal plants for family use ($\bar{x}$=3.0), medicinal plants for treating animal diseases ($\bar{x}$=2.9) reduction in environmental damages by heavy wind ($\bar{x}$=2.9) cash for purchase of food ($\bar{x}$=2.9), fodder for domestic animals ($\bar{x}$=2.9) and improved micro-climate conditions during climate extremes ($\bar{x}$=2.8). A grand mean of 2.95 was obtained from the mean score which revealed that agroforestry heard strong effect on household food security status of rural farmers.

These findings align strongly with the earlier finding of (Kareem, Adekunle, Adegbite & Soaga, 2017), That agroforestry fulfils the benefits of food security vis-à-vis the provision of food self-sufficiency, meeting household demands, employment generation, reduction of poverty, boosting research and extension services effective utilization of land and water, development of agricultural system, Gowland-Mwangi and Maina (2013) while underscoring the potential of agroforestry resources in attaining food security noted that through agroforestry it is possible to reverse loss of environmental resources such as forest, shrubs, trees and vegetation that provide alternative source of food and income for farmers. He added that African government through comprehensive Africa agriculture development programme (AADP) are leveraging on the potential of agroforestry to tackle under nutrition, rising food prices, inefficient food supply chain, depletion of natural resources, rural-urban migration economic instability and other food security challenges. Also, at this time when the menace of climate change is increasing devastating farms and undermines farmers 'productivity. The role of agroforestry in providing alternative for mitigation and adaptation to the effects of climate change cannot be over stressed. A warm climate is likely to increase incidence and geographic spread of insects and fungal disease, induce frequent droughts that result in increased rainfall to the point of slowing down the spread of drying of the maturing seeds, decrease in seed germination and potentially increase aflatoxin levels in the seeds during storage (Gowland Gwanji & Maina, 2003).

Fortunately, farmers are able to mitigate or adequately adapt these consequences through agroforestry practice like shelter belt establishment, alley cropping, bush fallowing, cover cropping and organic farming. In fact, the economic and social effects of agroforestry were further summarized by Ukpe et al. (2009) to include feeding the nation, creation of tourism and foreign exchange, source of livelihood, dressed carcass and other animal products. The report also affirmed that wildlife resources are used as edible products (food and medicine) non-edible product (tropies) and sport hunting (tourism).

The standard deviation (SD) value which ranged from 0.3 – 0.8 indicated that the farmers agreed on some items that measured the effects of agroforestry on agricultural livelihood of farmers and their farming output in the study area.

Table 3: Perceived effects of agroforestry on rural household livelihood and output in the area.

Perceived effects	Strongly Agree	Agree	Disagree	Strongly disagree	Mean	SD
Supply of adequate edible fruits	98	99	36	37	3.0*	0.5
Provision of supplementary food items	52	143	43	32	2.8*	0.3
Source of cash for purchase of food	85	94	59	34	2.9*	0.4
Provision of vegetable rich in calcium	139	83	23	25	3.2*	0.5
Provision of fuel for cooking	113	107	31	19	3.1*	0.6
Supply of fodder for domestic animals	76	118	49	27	2.9*	0.7
Provision of medicinal plants for family use	85	127	33	25	3.0*	0.3
Medicinal plants for treating animal Disease	89	90	62	29	2.9*	0.5
Reduced environmental damages by heavy wind	85	110	50	25	2.9*	0.7
Improved micro-climate conditions during climate extremes.	76	125	29	26	2.8*	0.8

Source: Field survey data, 2019

$\bar{X} \leq 2.5$ (no effect) $\bar{X} \geq 2.5$ (had effect).

Hypothesis of the study: The smallholder farmers do not differ significantly in their perceived effects of agroforestry on their agricultural livelihoods and farm output in the three agricultural zones of Imo State.

The result of the Analysis of Variance (ANOVA) on the perceived effect of agroforestry on their agricultural livelihood and farm output in the three agricultural zones of Imo State. The result revealed that there is no significant difference on the perceived effect of agroforestry on their agricultural livelihood of smallholder farmers and their farm output in Owerri, Orlu and Okigwe zone of the state having an F-value of 1.122 which is less than F-tabulated of 1.880 and a significant value (Sig.) of 0.120 which exceeded P–value of 0.05). Hence, the null hypothesis which states that rural smallholder farmers do not differ in the perceived effects of agroforestry on their agricultural livelihood and farm output of farmers in the 3 agricultural zones of Owerri, Orlu and Okigwe of Imo State is therefore accepted. This implies that the opinion of the rural farmers can be viewed as reliable information source on the effects of agroforestry on agricultural livelihood of rural farmers in agriculture as well as be used for policy making. This result collaborates the findings opinion of Nwozuzu et al. (2021) who noted that farmers involved in agroforestry largely share similar livelihood and output status when measured on the scale of income, basic needs and capability. In terms of income criterion, the annual income generation of the farmers was slightly above the poverty line of $2.15 per day adsorbing them of being regarded as poor farmers. This strongly suggests that agroforestry has the potential to lift people out of poverty.

Analysis of Variance (ANOVA) on the perceived effects of agroforestry on the agricultural livelihood and farm output of smallholder farmers in the 3 agricultural zones of Imo State (Owerri, Orlu and Okigwe)

	Sum of Squares	DF	Mean Square	F-cal	F-tabSig P≤0.05)	Decision
Between groups	12.112	251	1.336	1.122	1.8800.120^{ns}	**Null hypothesis is accepted**
Within Groups	56.150	18	1.211			
Total	68.262	269	2.547			

Source: SPSS analysis of field survey data, 2019

ns = Not significant

CONCLUSION:

The study concludes that small farmers majored on agroforestry practiced like Agro-horticulture (planting fruit trees or other perennial crops with annual crops, Improve crop fallow (leaving crops or shrubs in order to improve soil) and Taungya system (cultivation of annual crop among young trees). Factors considered as constraints to agroforestry practice include Land security, lack of processing machineries, lack of land control and and high cost of farm inputs. Agroforestry provided vegetable rich in calcium, fuel wood for cooking, adequate edible fruit and vegetable, medicinal plants for family use, medicinal plants for treating animal diseases, reduction in environmental damages by heavy wind, cash for purchase of food, fodder for domestic animals. The result revealed that there is no significant difference on the perceived effect of agroforestry on smallholder farmers agricultural livelihood and their farm output in Owerri, Orlu and Okigwe of the study area.

RECOMMENDATIONS

1. Government at all level must implement comprehensive, multi-level approaches by formalizing all types of land rights, strengthening legal frameworks and land administration, and establishing participatory processes for land use planning and its security.
2. Ownership and control of land by rural smallholder farmers around the study area should be improved by reviewing land tenure policies that traditionally constrain from owning land, such as through co-operative land leasing.
3. There should be advocacies by intervention agencies (including extension services) in creating better awareness among farmers about agroforestry and its enormous potentials in addressing economic and social aspect of farmers' life.

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