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Effect of Technologies for African Agricultural Transformation Programme (Taat) on Cassava Output of Participants in Ibadan-Ibarapa Agricultural Zone, Oyo State, Nigeria

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Abstract

*The study assessed the effect of Technologies for African Agricultural Transformation Programme (TAAT) on cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State, Nigeria. The objectives of the study were to: ascertain the extent of dissemination of TAAT cassava production technologies to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State, determine participants' level of adoption of TAAT cassava production technologies and estimate the cassava output of TAAT participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. The study adopted a descriptive survey research design. A multistage sampling procedure was used in selecting a sample size of sixty (60) TAAT cassava farmers for the study. Data were obtained with the aid of structured questionnaire, and analyzed using descriptive and inferential statistics such as percentages, means and simple regression analysis. The result showed that variety selection ($\bar{x}$ = 4.00), production of specially blended fertilizers and application ($\bar{x}$ = 3.87), appropriate application of pesticides and herbicides ($\bar{x}$ = 3.67) and appropriate plant spacing ($\bar{x}$ = 3.35) were the TAAT cassava production technologies disseminated to a high extent to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. Majority of the participants adopted improved cassava varieties ($\bar{x}$ = 3.73), weeding interval/application of herbicides ($\bar{x}$ = 3.63), fertilizer application ($\bar{x}$ = 3.18), appropriate plant spacing ($\bar{x}$ = 3.15) and site selection/land preparation ($\bar{x}$ = 3.05) in the study area. The mean estimated cassava output of TAAT participants was 22,666.67kg/ha. Adoption of TAAT cassava production technologies had significant effect (9.022***) on the cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. The study concluded that the Technologies for African Agricultural Transformation Programme increased cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. Based on the findings of the study, it recommended that efforts should be directed towards scaling up the dissemination of improved cassava production technologies to cassava farmers in order to sustain their adoption levels of improved cassava technologies and increase cassava output in the study area.*

Key words: Effect, TAAT, technologies, cassava output, participants

INTRODUCTION: Nigeria is the world's largest cassava producer with an estimated annual production of over 50 million metric tonnes from a cultivated area of about 3.7 million hectares (Food and Agriculture Organization Statistics (FAOSTAT), 2019). Cassava is the world's fourth most important staple food behind rice, wheat and maize and forms part of the diets

of more than a billion people worldwide. Given its resistance to drought and depleted soils and the possibility of planting and harvesting it almost throughout the year, cassava is crucial to food security, especially in areas prone to drought and poor soils (Adebayo, 2023). Cassava is important not only as a food crop but even more so as a major source of income for rural households in Nigeria (Akpan and Effiong, 2022). However, despite the economic importance of cassava, the national average yield for the crop still remains low, at about 13.63 metric tonnes per hectare reflecting a shortfall of 65.9 percent away from the potential yield of about 40.0 metric tonnes per hectare (FAO, 2018). Majority of the cassava produced in the country including Oyo State are produced by small-scale farmers who are poor in resources (Uzochukwu, Nwaobiala and Mbagwu, 2021). The African Development Bank embarked on a mission to address several challenges of poverty, low food production, climate change, unemployment etc bewildering the African Continent holistically, through the implementation of the Technologies for African Agricultural Transformation programme (TAAT). The programme, established in 2017, is an integral part of the Bank's Feed Africa Strategy, 2016–2025 (TAAT, 2019). The programme was funded by the African Development Bank (AfDB) and led by the International Institute of Tropical Agriculture (IITA) to contribute to job creation, food and nutrition security, income generation and improved livelihoods of the African population (Adeyanju, Mburu, Gituro, Chumo, Mignouna, Mulinganya and Ashagidigbi, 2023). TAAT's broad mandate is to harness proven technologies to raise agricultural productivity in Africa; mitigate risks and promote diversification and processing in 18 agricultural value chains within eight priority intervention areas. Overall, it aims to increase food output by 100 million tons and lift 40 million people out of poverty by 2025. Specifically, the programme deploys technologies at scale along nine commodity value chains; cassava, maize, rice, wheat, high-iron bean, orange-fleshed sweet potato, sorghum, millet, livestock and aquaculture (TAAT Clearinghouse, 2021). Cassava (*Manihot esculenta*) is one of TAAT's priority commodities because of its huge importance to food and nutritional security, income generation and rural development in general across Africa (TAAT Clearinghouse, 2021). Furthermore, the Cassava Compact of TAAT, led by the IITA established demonstrations farms where training activities were conducted across three agro-ecologies covering North-central, South-east and South-west Nigeria based on technology toolkits that combined improved varieties, correct tillage, optimum plant density, fertilization and integrated weed control measures that guarantee improved cassava yields. Specifically, the technologies developed for cassava production and disseminated to farmers in Nigeria, Oyo State inclusive include; improved cassava varieties (Golden-fleshed cassava, TMS-961632, TME 419 and CR36-5), cassava seed-bulking, semi-autotrophic hydroponics, six-step weed management, fertilizer application among others (TAAT Clearinghouse, 2021). These technologies were disseminated to participants with the overall aim of boosting their output and income. As a result, TAAT is estimated to have boosted cassava output of farmers in Nigeria, Oyo State inclusive, by more than 10 metric tonnes per hectare and raised beneficiary incomes by an average of 38% through the dissemination and adoption of improved cassava production technologies (TAAT Clearinghouse, 2021). However, Adebayo (2023) noted that cassava production in Nigeria, Oyo State inclusive is still characterized by a wide gap between potential and actual cassava yields per hectare. Giving the participation of cassava farmers in the TAAT programme in Ibadan-Ibarapa Agricultural Zone of Oyo State, the expected effect on cassava output is not very obvious. This can only be ascertained by assessing the effect of Technologies for African Agricultural Transformation Programme (TAAT) on cassava output of participants in Ibadan/Ibarapa Agricultural Zone of Oyo State. It is in this regard that the study was conceived.

Objectives of the Study: The broad objective of this study was to assess the effect of Technologies for African Agricultural Transformation Programme (TAAT) on cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. The specific objectives include the following: ascertain the extent of dissemination of TAAT cassava production technologies to participants in

Ibadan-Ibarapa Agricultural Zone of Oyo State; determine participants' level of adoption of TAAT cassava production technologies; and estimate the cassava output of TAAT participants in Ibadan/Ibarapa Agricultural Zone of Oyo State.

Hypothesis: Adoption of TAAT cassava production technologies do not have significant effect on the cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

METHODOLOGY: The study was conducted in Ibadan-Ibarapa Agricultural Zone of Oyo State. Ibadan-Ibarapa Agricultural Zone comprises Ibarapa East, Akinyele, Ido and Oluyole, Ona-ara and Egbeda local government areas (Adedayo and Omosile, 2020). Ibarapa East local government area covers a land area of 705.78sqkm^2 with an estimated population of over 120,220 persons according to the 2006 Census figures. Ido local government area has ten political wards with a land area of 1,010,950km^2 (National Population Commission, 2006). The study adopted a descriptive survey research design and this type of research is used to elicit information from a sample of a well-defined population (Esezi, 2018). The population of the study comprised all cassava farmers that participated in TAAT programme activities in Ibadan-Ibarapa Agricultural Zone of Oyo State. Multi-stage sampling procedure was used to select the sample size for the study. For stage one, two (2) local government areas (LGAs) were purposively selected in the State. The purposive selection of these two (2) LGAs was because of the preponderance of TAAT activities in the LGAs. For stage two, there was a purposive selection of five (5) communities each from the selected LGAs. The purposive selection of these communities was because of the intensity of Cassava Compact Cluster activities in the selected communities. This gave a total of ten (10) communities. For the final stage, simple random sampling technique was used to select six (6) cassava farmers from each of the selected ten (10) communities, which gave a grand total of sixty (60) TAAT cassava farmers which constituted the sample size for the study.

Table 1: Sample size distribution

Local government area	Communities	Sample size
Ido	5	6
Ibarapa East	5	6
Grand total	**10**	**60**

Data collection and analysis

Primary data were obtained with the aid of structured questionnaire, and analyzed using descriptive and inferential statistics such as percentages, means and simple regression analysis. To ascertain the extent of dissemination of TAAT cassava production technologies to participants was realized using mean scores. Data were generated by presenting the respondents with items rated on a Likert scale, which was based on the question options of: very high extent = 5, high extent = 4, moderate extent = 3, low extent = 2 and very low extent = 1. The options were quantified as 1, 2, 3, 4 and 5. The mean of 1, 2, 3, 4 and 5 equals 3.0 i.e. 1+2+3+4+5/5 = 3.0. The scored responses were calculated and pooled to obtain the mean scores on the extent of dissemination. The extent of dissemination of TAAT cassava production technologies to participants was thus established in a 3-category of high extent, moderate extent and low extent by dividing the maximum response score (5) into 3 to obtain the class interval of 1.66. Afterwards, the class interval (1.66) was successively deducted from the maximum response score (5) to obtain the various class ranges for the 3 categories viz: low extent = 0 – 1.66; moderate extent = 1.67 – 3.33; high extent = 3.34 – 5.00.

To determine participants' level of adoption of TAAT cassava production technologies was realized using mean scores. The adoption stages were allocated weights as follows: aware = 1; interest = 2; evaluation = 3; trial = 4 and adoption = 5. In using the adoption scale, a mid-point was obtained by adding 5, 4, 3, 2 and 1 which gave 15 and when divided by 5 gave a mean score of 3.0. For the purpose of decision making and to identify the different stages of adoption of technologies by participants, the categorization followed in accordance with Nwaobiala, Igwe,

Kalu and Akwada (2022); awareness stage = 1.0 – 1.49; interest stage = 1.50 – 1.99; evaluation stage = 2.0 – 2.49; trial stage = 2.50 – 2.99; and adoption stage = ≥ 3.0.

Ho: Adoption of TAAT cassava production technologies do not have significant effect on the output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State was tested using simple regression analysis.

The extent to which adoption of TAAT cassava production technologies influenced the output of participants was implicitly ascertained using the simple regression model:

$Y = bo + bx + e$ ……(1)

Where,
Y = Output (Kg)
x = Adoption (mean score)
b = intercept or slope
o = co-efficient
e = error term.

The choice of the lead equation was based on the magnitude of significant variable and coefficient of determination (R^2) as conformed to *a priori* expectation.

RESULTS AND DISCUSSION

Objective 1: Ascertain the extent of dissemination of TAAT cassava production technologies to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

Table 2: Extent of dissemination of TAAT cassava production technologies to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

S/N	TAAT training activities	VHE	HE	ME	LE	VLE	$\sum F\bar{x}$	$\bar{x}$	Remark
1	Site selection/land preparation	23(115)	17(68)	9(27)	11(22)	0(0)	232	1.82	Moderate
2	Tillage operations	7(35)	8(32)	8(24)	15(30)	22(22)	143	2.38	Moderate
3	Ploughing and ridging of fields	0(0)	6(24)	10(30)	16(32)	28(28)	114	1.90	Moderate
4	Variety selection	25(125)	19(76)	7(21)	9(18)	0(0)	240	4.00	High
5	Appropriate application of pesticides and herbicides	18(90)	17(68)	12(36)	13(26)	0(0)	220	3.67	High
6	Appropriate plant spacing	16(80)	15(60)	12(36)	8(16)	9(9)	201	3.35	High
7	Cassava seed-bulking	0(0)	4(16)	10(30)	28(56)	18(18)	120	2.00	Moderate
8	Production of specially blended fertilizers and application	0(0)	7(28)	6(18)	16(32)	31(31)	109	3.87	High
9	Semi autotrophic hydroponics for cassava multiplication	0(0)	0(0)	11(33)	13(26)	36(36)	95	1.58	Low
	Grand mean							**2.73**	**Moderate**

Source: Computed from field survey data, 2023

Table 2 above revealed that variety selection ($\bar{x}$ = 4.00), production of specially blended fertilizers and application ($\bar{x}$ = 3.87), appropriate application of pesticides and herbicides ($\bar{x}$ =

3.67) and appropriate plant spacing ($\bar{x}$ = 3.35) were the TAAT cassava production technologies disseminated to a high extent to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. This implies that TAAT cassava farmers were actively trained on improved cassava production technologies such as variety selection, appropriate application of pesticides and herbicides, appropriate plant spacing and production of specially blended fertilizers and application. This finding is similar to those of Nwaobiala, Odoemelam and Dybia (2020) who reported that rural farmers in Imo State were trained on improved sweet potato farming practices such as planting date and spacing ($\bar{x}$ = 2.3), use of improved sweet potato varieties ($\bar{x}$ = 2.2) and fertilizer application ($\bar{x}$ = 2.0). The grand mean score ($\bar{x}$ = 2.73) also revealed that TAAT cassava production technologies were disseminated to a moderate extent to participants in Oyo State. This has huge implications for the activities of TAAT and extension agencies as there is the need to scale-up the dissemination of improved cassava technologies to farmers in the study area.

Objective 2: Determine participants' level of adoption of TAAT cassava production technologies in Ibadan-Ibarapa Agricultural Zone of Oyo State.

Table 3: Participants' level of adoption of TAAT cassava production technologies in Ibadan-Ibarapa Agricultural Zone of Oyo State.

S/N	TAAT cassava technologies	Awareness	Interest	Evaluation	Trial	Adoption	$\sum F\bar{x}$	$\bar{x}$	Rem
1	Site selection/land preparation	10(10)	17(34)	8(24)	10(40)	15(75)	183	3.05	Ado
2	Appropriate plant spacing	11(11)	8(16)	10(30)	23(92)	8(40)	189	3.15	Ado
3	Improved cassava varieties	5(5)	10(20)	8(24)	10(40)	27(135)	224	3.73	Ado
4	Cassava seed-bulking	13(13)	21(42)	5(15)	15(60)	6(30)	160	2.67	Trial
5	Fertilizer application	11(11)	15(30)	8(24)	4(16)	22(110)	191	3.18	Ado
6	Appropriate application of pesticides	10(10)	18(36)	7(21)	15(60)	10(50)	177	2.95	Trial
7	Weeding interval/application of herbicides	14(14)	9(18)	8(24)	3(12)	26(150)	218	3.63	Ado
8	Semi autotrophic hydroponics	31(31)	15(30)	6(18)	4(16)	4(20)	115	1.92	Inter
	Grand mean							**3.04**	**Ado**

Source: Computed from field survey data, 2023

Table 3 above revealed that improved cassava varieties ($\bar{x}$ = 3.73), weeding interval/application of herbicides ($\bar{x}$ = 3.63), fertilizer application ($\bar{x}$ = 3.18), appropriate plant spacing ($\bar{x}$ = 3.15) and Site selection/land preparation ($\bar{x}$ = 3.05) were the TAAT cassava production technologies adopted by participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. This might be attributed to the fact that these were some of the TAAT cassava production technologies that were highly disseminated to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. This finding is similar to those of Onwusiribe, Nmerengwa and Amadi (2022) who reported that fertilizer application ($\bar{x}$ = 4.69) and improved cassava varieties ($\bar{x}$ = 3.73) were some of the improved cassava technologies adopted by cassava farmers in Abia State. This finding is also in agreement with those of Ukonu, Egesi, Ekwe and Kalu (2022) who reported a high level of utilization of cassava technologies such as site selection technology ($\bar{x}$ = 3.48), plant spacing ($\bar{x}$ = 3.18) and improved cassava varieties ($\bar{x}$ = 2.92) among sampled respondents in Umuahia Agricultural Zone of Abia State. The grand mean

score ($\bar{x}$ = 3.04) also revealed that majority of the cassava farmers adopted TAAT cassava production technologies in Ibadan-Ibarapa Agricultural Zone of Oyo State. This is encouraging as this is in tandem with the mandate of TAAT that aims to rapidly expand access of smallholder farmers to high yielding agricultural technologies that improve their food production, assure food security, and raise rural incomes.

Objective 3: Estimate the cassava output of TAAT participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

Table 4: Estimated cassava output of TAAT participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

Output (Kg/ha)	Frequency (n= 60)	Percentage (%)
5,000 – 25,000	43	71.7
26,000 – 45,000	11	18.3
46,000 – 65,000	6	10.0
66,000 – 100,000	-	-
Mean		**22,666.67**

Source: Computed from field survey data, 2023

Table 4 showed the estimated cassava output of TAAT participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. The result revealed that majority (71.7%) of TAAT participants realized cassava output of between 5,000 – 25,000kg/ha while 18.3% realized cassava output of between 26,000 – 45,000kg/ha. In addition, 10.0% of TAAT cassava farmers had cassava output of between 46,000 – 65,000kg/ha. The mean estimated cassava output of TAAT participants was 22,666.67kg/ha. Nwaobiala, Uzochukwu and Chukwu (2023) in a similar study conducted in Akwa Ibom State reported that majority (55.0%) of United States Agency for International Development (USAID) farmers had cassava output of between 26000 – 65000kg/ha while a fairly moderate proportion (38.9%) realized cassava output of between 66000 – 100,000kg/ha.

Hypothesis: Determine the effect of adoption of TAAT cassava production technologies on cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

Table 5: Simple regression result on effect of adoption of TAAT cassava production technologies on cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State.

Parameters	Coefficient	Standard error	t-value
Constant	0.127	0.789	0.161
Adoption of TAAT cassava technologies	0.203	0.068	2.985**
R-squared	0.782		
R-adjusted	0.611		
F-ratio	9.022***		

Source: Computed from field survey data, 2023
** = significant at 5% and *** = significant at 1%

Table 5 showed the regression estimate of the effect of the adoption of TAAT cassava production technologies on the cassava output of participants. The r^2 value (0.782) implies that about 78.2% of the variation in cassava output of participants was explained by the independent variable, indicating goodness of fit. The F-ratio of 9.022 was statistically significant at 1% level of significance indicating that the adoption of TAAT cassava production technologies had significant effect on the output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. This conforms to *a priori* expectation because adoption of improved production technologies is expected to lead to increased crop output. This further implies that adoption of improved cassava technologies would lead to increased cassava output. Onwusiribe *et al.* (2022) noted that the increase in adoption of improved cassava technologies would lead to an expected increase in output and income of cassava farmers.

Conclusion and Recommendation: The study concluded that the Technologies for African Agricultural Transformation Programme increased cassava output of participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. TAAT cassava production technologies were disseminated to a moderate extent to participants in Ibadan-Ibarapa Agricultural Zone of Oyo State. Majority of the participants adopted TAAT cassava production technologies. Therefore, it is recommended that efforts should be directed towards scaling up the dissemination of improved cassava production to cassava farmers in order to sustain their adoption levels of improved cassava technologies and increase cassava output in Oyo State.

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