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Farmers' Coping Strategies to Mitigate Acha Cultivation Challenges in Plateau State, Nigeria

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ABSTRACT

Acha farming is laden with challenges across the value chain which could impact negatively on farmers socio-economic wellbeing. Thus, this study investigated the coping strategies employed to reduce Acha farming challenges among farmers in Plateau State. The population of this study comprised all the registered Acha farmers in two of the three agricultural zones in Plateau State. These two agricultural zones are Plateau North and Plateau Central with an estimated 3,143 registered Acha farmers according to Plateau Agricultural Development Programme (PADP). Out of the population, only 400 Acha farmers were randomly selected using Taro Yamane's formula. The study adopted semi-structured questionnaire and data obtained were analysed with frequencies and percentages while the hypothesis was analyzed with the use of Pearson Product Moment Correlation (PPMC). Findings showed that the foremost challenges facing Acha farmers were inadequate harvesting equipment and high cost of labour (93.6%), lack of access to improved processing equipment and low-quality packaging sacks (90.5%). The highest ranked coping strategies employed by the farmers were to have adequate knowledge of climate condition (90.5%), use community cooperatives to reduce high cost of labour (89.4%), and belong to a cooperative to obtain a loan (74.7%). PPMC analysis showed that challenges encountered significantly influenced the coping strategies employed by the farmers in the positive direction ($r=1.86$; $p<0.05$). The study concludes that farmers, in a bid to overcome Acha farming challenges employs a number of strategies which include adequate knowledge of climate condition, use of community cooperatives to reduce high cost of labour and belonging to a cooperative to obtain a loan. The study recommended among others that farmers should work together as a group through their cooperatives, to link up with the elite in their enclaves in order to access extension agents to bolster training and extension programmes for Acha farmers on modern farming techniques, pest management, and best practices in pre and postharvest handlings.

INTRODUCTION

Acha is thought to be the earliest native African cereal. Its cultivation is said to date 7,000 years

(Cruz, 2004). Acha cultivation is carried out in many African nations, most especially in the West African countries. Acha does not require much rich soil to yield well, and therefore, can survive on a different soil type except in very clayed soil. In Nigeria, farmers grow acha in large quantity for

commercial purposes in some states including: Federal Capital Territory (FCT) Abuja, Niger, Kaduna, Nassarawa, Kebbi, Gombe, Bauchi and Plateau where Plateau State is currently known as the highest producing state with average annual production of about 20,000 tons (Popoola, Olori-Oke, Akanbi, Yakubu, Mbah & Adedire, 2020). Acha crop fulfils several socio-economic purposes because of its high nutritional content and cultural uses in Plateau State. Most importantly, Acha serves as food, provides job opportunity and income, and provides medicinal remedies for infants, lactating mothers, convalescents and diabetics. The straw and chaff can be used to feed ruminant animals, fillers for matrasses and in making mud traditional blocks for local hut construction. Indeed, the usefulness and importance of Acha to the farmers wellbeing as well as the economy of the cultivating community and wider society cannot be overemphasized.

However, the farmers are faced with a number of challenges that have socio-economic implications for the farmers and by association the state. Acha farmers in Plateau State face challenges in accessing quality seeds, fertilizers, and other inputs required for successful farming. It could be attributed to inadequate access and inflated cost of these resources. Similarly, farmers do not have access to modern technologies such as mechanized equipment which could significantly improve their Acha farming, these challenges have tendencies to bring low yields and reduced income for Acha farmers.

Acha farmers coping strategies vary according to several factors, which include gender, education, family size, size of farm and location of farm. Generally, though in recent times it was observed that most of the farmers were now forming cooperative societies in order to cope with the challenges of inadequate capital for effective farming of acha cereal on the Plateau (Jideani, 2005). The study by Fitria & Riyadi (2022) affirmed that coping mechanisms can include practical strategies such as finding alternative solutions, collaborating with fellow farmers, social support from family or related institutions, using humors to unravel tensions, or adapting to changing situations. More Acha farmers are cultivating early maturing varieties of Acha, to help curb the menace of Fulani herdsmen incursion on their farms. They hope to harvest these early maturing crops before the season of the roaming of cattle on their farms.

Majority of Acha farmers employ a variety of coping mechanisms to mitigate difficulties involved in harvesting Acha, including the use of available harvesting tools or implements, total uprooting of the Acha plant, and cooperative efforts. The manual harvesting of Acha, a tiny grain cereal crop, can be minimized and crop output increased by use of the right harvesting methods and equipment. Adama, Ezeaku and Okoye, (2019) investigated how farmers in Nasarawa dealt with difficulties encountered when producing Acha. According to the study, farmers typically harvested Acha using traditionally available harvesting tools and equipment, such as sickles and knives. In addition, farmers frequently uprooted the entire Acha plant. By using this technique, you may ensure that all of the grains are gathered and lower the chance that you will suffer losses from grains that break during handling and shipping. Farmers were found to employ cooperative efforts during harvest as a coping mechanism to get through difficulties in Acha production. In order to harvest Acha, farmers would frequently collaborate with fellow Acha farmers, which can boost productivity and lower labor expenses. Additionally, this approach can help farmers develop stronger communities and social bonds.

METHODOLOGY

A cross-sectional design was chosen for this study based on its effectiveness in collecting data on people's views, feelings, attitudes, and perceptions regarding various topics. The study area Plateau State is in the North Central region of Nigeria. Plateau State is a state located between latitude 08.24'N, latitude 008.32' and longitude 010.38' East, with an area of 26,026 km^2. The population of this study comprised all the registered Acha farmers in two of the three agricultural zones in

Plateau State. These two agricultural zones are Plateau North and Plateau Central with a total population of 4,197,315 (NPC Projection, 2021) of which an estimated 3,143 according to Plateau Agricultural Development Programme (PADP) are registered Acha farmers.

Multi-stage sampling techniques was employed to draw sample from the population. First, two Agro-Ecological Zones were purposively selected from the existing three, based on the concentration of Acha farming in those two. The two zones are Plateau North and Plateau Central. Secondly, using the simple random sampling technique, two (2) local government areas (LGAs) were selected from each of the two agro-ecological zones since Acha cultivation is fairly evenly distributed in all the LGAs across the two zones, making a total of four (4) LGAs. Thirdly, from each of the four (4) LGAs, one (1) ward was chosen using the simple random sampling technique, making a total of 4 wards. Subsequently, from each of the wards, five villages were selected making a total of 20 villages. Finally, twenty (20) respondents were selected from each of the villages using the simple random sampling technique, making a total of 400 respondents for the study upon whom semi-structured interview and Focus Group Discussion were conducted.

The study adopted semi-structured questionnaire and the essence of this stems from the fact that the educational level of the majority of the respondents is low. Besides, it restricts respondents to limited options provided by the researcher for easy analysis. Data were analyzed using both descriptive and inferential statistical tools. Specifically, objectives of the study were analyzed with simple frequencies and percentages while the hypothesis was analyzed with the use of Pearson Product Moment Correlation (PPMC).

RESULTS AND DISCUSSIONS

Challenges Facing Acha Farmers

This study investigated the challenges facing Acha farmers during cultivation. Results are presented in Table 1.

Land clearing: On land clearing challenges, 90.5% (344) of the respondents lacked access to credit facility, 74.7% (284) respondents lacked adequate technical know-how of Acha production, 28.4% (108) respondents were affected by climate change, 27.4% (104) respondents were limited by land acquisition while 7.4% (28) faced the problem of theft, kidnapping, and banditry related issues. This shows that the leading challenges facing majority of farmers on land clearing stage of Acha cultivation in Plateau State, were lack of access to credit facility and lack of adequate technical know-how of Acha production.

Despite numerous agricultural policies and programs such as Anchor Borrower, Agricultural Credit Support Scheme (ACSS), introduced by Federal Government of Nigeria in recent times to boost farmers' access to farm loan, the category of farmers cultivating Acha in Plateau State remains credit-constrained. Additionally, the existence of Bank of Agriculture and other commercial banks as well as microfinance banks, have not been able to adequately provide farmers with access to farm loans. By implication, these farmers are limited by the area of land to be cleared for Acha production. This challenge might be one of the attributable factors for the small land area cultivated by the Acha farmers as presented in Table 1. This finding clearly indicated that Acha farmers still lack the financial capacity to cultivate large areas of land for commercial purpose. Other studies for instance, Oluwadare (2019) have shown that 90% of the 38 million farmers in Nigeria (which is approximately 20% of the nation's population) do not have access to credit facilities. Likewise, the findings of Akudugu (2016) It was estimated that only 5% of African farmers have formal credit; across developing countries, on average, 5% of borrowers have taken out 80% of the credit they applied for.

On the subject of inadequate technical know-how in land clearing for the cultivation of Acha, the findings showed that a large percentage (74.4%) had no access to technology/mechanization for Acha production in Plateau State. The manual stumping, slash and burn methods dominate the adopted land clearing techniques used by the Acha farmers in the study area; instead of bulldozing which is an improved and faster method of land clearing.

Table 1: Challenges Facing Acha Farmers

Production/cultivation Challenges	Frequency	Percentage
Land clearing:		
Lack of credit facility to expand farm	344	90.3
Inadequate technical know how	284	74.4
Problem of land acquisitions	104	27.4
Unpredicted climate condition	108	28.4
Theft/kidnapping/banditry issues	28	7.37
Purchasing Acha seeds:		
Difficulty in accessing quality seed	296	77.9
High cost of Acha seeds	272	71.6
Lack of fund to purchase seed	240	63.2
Hoarding of seeds	28	7.4
Tilling the ground:		
Lack of credit facilities	340	89.5
Inadequate technical known how	284	74.7
Land acquisition	104	27.4
Climate condition	108	28.4
Theft/Kidnapping/Banditry issues	28	7.4
Planting:		
High infestation of insects/rodents	336	88.4
High cost/inadequate labour	356	93.7
Lack of fund for manual labour	120	31.6
Inadequate access to herbicide	160	42.1
Inadequate knowledge of planting equipment	254	66.8
Weeding:		
Inability to access farm herbicide	120	31.6
High cost of labour for weeding	364	95.8
Inadequate knowledge of selective herbicide application	116	30.5
Heavy rainfall	132	34.7

Source*:* Field Survey, 2022

Purchasing Acha seedlings: On challenges related to the purchase of Acha seeds, 77.9% (296) of the respondents faced difficulty in accessing quality and improved seed, 71.6% (272) respondents reported high cost of Acha seed, 63.2% (240) complained of lack of funds to purchase seeds while 7.4% (28) respondents indicated hoarding of quality seed. This finding indicates that Acha farmers are faced with multiple challenges which include hoarding of Acha seeds by individuals which are most likely to be traders. The challenge is however made worse by farmers' lack of money when and where the seeds become available.

Difficulty in accessing quality and improved Acha seeds is one of the indications that extension organizations covering the study area are not sufficiently disseminating information on the

use/adoption of improved variety of Acha seed to the farmers, despite the availability of new and improved variety of Acha**.** Recently**, the National Cereals Research Institute (NCRI), Badeggi, as affirmed by Yusuf (2022), announced the release of new varieties of rice, Acha and soybean for seed multiplication.** The yield potential of these varieties is 1.48 t per hectare. Yet, these improved varieties of Acha appear not to have reach the farmers in the study area, where the crop is well known for its cultivation. The existing weak **farmer-extension-research institutes could be one of the reasons for the inadequate farmers updated technological/scientific knowledge emanating from research institutes. The continued cultivation of the two popularly known local varieties (***Digitaria exilis* and *Digitaria iburua***) seed implies low yield and low income return per hectare of Acha farm size cultivated by farmers.** Ibrahim (2001) **concluded that the** product is often short in supply because of low grain yield per hectare obtained by farmers, which is between 300-500kg and 500-700kg per hectare for D. exilis and D. iburua respectively.

Tilling: Regarding tilling of ground for Acha cultivation among respondents, result shows that 89.5% (340) indicated lack of credit facilities, 74.7% (284) reported inadequate technical knowhow, 28.4% (108) faced effects of climate changes, 27.4% (104) faced difficulty in acquiring land and 7.4% (28) faced the problems of theft, kidnapping, and banditry related issues. The foremost challenges facing majority of farmers during tilling of ground for Acha cultivation in Plateau State were lack of access to adequate credit facilities and inadequate technical knowhow related to ground tilling.

Although the cultivation of Acha does not require heavy tilling of the soil, but if it is not tilled adequately, it affects production. Unfortunately, a large number of Acha farmers in the study area lacked adequate technical knowhow of ground tilling. The findings of Ajeigbe et al., (2016) agreed that, tillage is the process of tillage of land for the cultivation of grain crops. The most common types of tillage machines used for this purpose are power tillers; ox ploughs; tractors; and manual tillage. In this study, manual tilling is the dominated practice. By implication, a large labour force would be required which in turn leads to drudgery not to mention the financial commitment involved. These issues are part of the factors affecting the farmers' willingness to increase Acha production.

Planting: Information on challenges faced during planting of Acha seeds among respondent indicated that 93.7% (356) experience high cost and inadequate labour to cultivate Acha farms, 88.4% (336) respondents were faced with high infestation of insect, 66.8% (254) respondents suffered inadequate access to Acha planting equipment, 42.1% (160) respondents did not have access to adequate herbicide while 31.6% (120) respondents lacked funds for this section of cultivation. Findings imply that high cost and inadequate labour to cultivate Acha farm, high infestation of insect and inadequate access to Acha planting equipment were the leading challenges encountered by farmers in planting of Acha seeds in the study area.

Implication of this result is that Acha production in Plateau State is capital intensive. Consequently, without access to credit facilities, many Acha farmers would be hindered from producing Acha at in large quantity, and this could in turn affect their income and profitability of the farm venture. A study conducted by Duniya, et al., (2015) have also shown that the main constraints encountered by Acha farmers in Bauchi State include high cost of labour, this takes the largest share (52.7%) of the short-run cost of production. High cost of labour is the biggest challenge for farmers in accessing labour in North Central Nigeria. Akintobi, Idu and Ajah (2017) in a study concluded that there is an ongoing decline in the availability of agricultural labour which will result in increased cost of production for the small-scale farmers.

On the problem of high infestation of insect/pests/rodents on Acha indicated by majority of the farmers, this implies that Acha farming has been threatened by the infestation of insects/pests. The study of Umaru, Kolo, Bright and Abo (2013) mentioned stem borers, the beetles and the leaf hoppers as the main insect pests found associated with the Acha crop and significantly contributed to the low yield of the crop. Stem borers constitute the most widely distributed and injurious group of insect pests of cereal crops. They are commonly known to be one of the limiting factors of cereal production worldwide.

Weeding: Result on problems faced during weeding of Acha farms indicated that 95.8% (364) respondents faced high cost of labour for this activity, 34.7% (132) respondents experienced heavy rainfall, and 31.6% (120) respondents were unable to access adequate farm area while 30.5% (116) respondents lacked the adequate knowledge of selective herbicide application. Findings implied that high cost of labour was the leading problem facing farmers during weeding of Acha farms in Plateau State. This finding corroborates the report by Sani and Silas (2012), who found that production constraints facing Acha farmers in Plateau State were inadequate finance, farm inputs and use of primitive methods.

The findings showed that weeding is one of the major challenges by Acha farmers in the study area. Of course, this is only the case if farmers do not have access to proper support or if they cannot afford to hire labour because of the high labour costs, farmers could be discouraged from cultivating the crop. The finding is in line with the report by Popoola et al. (2020) who investigated the constraints of Acha production in Jos South, Plateau state. This imply that one of the main constraints to Acha production is the difficulty of the weeding and threshing process.

Coping Strategies to Mitigate the Effects of Challenges Faced by Acha Farmers

This study further examined the coping strategies Acha farmers adopt to mitigate the challenges they face along the production value chain. Primary data on farmers' coping strategies analyzed and presented with frequency and percentage are displayed in Tables 2.

Table 2: Coping strategies to challenges during land clearing

Coping strategies	Frequency	Percentage
Join cooperatives for access to credit facility to expand farm	344	90.5
Proper planning for land acquisitions	284	74.7
Competency technical know-how of improved Acha farming practices	104	27.4
Adequate knowledge of the climate condition	108	28.4
Adequate security measure to prevent kidnapping and theft	28	7.4

Source: Field Survey, 2022

Table 2 shows the result on coping strategies employed by farmers to mitigate the effects of the challenges faced during land clearing for Acha cultivation, where 90.5% (344) of the respondents join cooperatives for access to credit facility to expand their farm, 74.7% (284) used proper planning for land acquisitions, 28.4% (108) applied adequate knowledge of the climate condition, 27.4% (104) applied competency technical know-how of improved Acha farming practices while 7.4% (28) put in place adequate security measure to prevent kidnapping and theft in the study area.

In accordance with the present study, Oluwadare (2019) affirmed that, farmers generally adopt several strategies to cope with farming challenges during land clearing such as sourcing for adequate farm credit, most especially loan. Clearing large area for commercial purpose may not be achieved with family labour or manual operation system, but the application of farm machinery (Bulldozer) to clear the land or the employment of farm labourers. Either of these methods require

some amount of money/finance, thus, accessing adequate farm credit becomes necessary and expected measure to tackle problems limiting the clearing of adequate hectares of land for the cultivation of Acha in the study area.

Table 3: Coping strategies to challenges during purchase of Acha for cultivation

Coping strategies	Frequency	Percentage
Prompt purchase of high yield seeds	296	77.9
The use of cooperative to reduce high cost of Acha seeds	272	71.6
The use of credit facility to purchase quality seed	240	63.2
Borrowing from friends and family for future repayment	28	7.4

Source: Field Survey, 2022

Table 3 shows the result on coping strategies employed by farmers to mitigate the effects of challenges during purchase of Acha for cultivation where 77.9% (296) of the respondents employed prompt purchase of high yield seeds, 71.6% (272) use of cooperative to reduce high cost of Acha seeds, 63.2% (240) used credit facility to purchase quality seed while 7.4% (28) relied on borrowing Acha from friends and family for future repayment.

By implication, Acha farmers' groups/cooperatives had performed the roles of providing members necessary agricultural information and inputs for Acha production. Generally, cooperation among farmers exists in search of common solutions to their problems to advance prosperity among farmers. The findings of Wossen, et al., (2017) confirmed that timely purchase of quality/improved Acha seed is critical to mitigating the challenges of accessing seed for the cultivation of Acha. Acha farmers often devise the strategy of buying the high yielding variety on time, in order to ensure quality seeds are purchased. Wossen, et al., (2017) further supported that there is well-documented empirical evidence on the roles of agricultural cooperatives in enhancing the adoption of improved agricultural technologies/information, access to quality/improved seeds, granting credit facilities to members, mobilizing and distributing credit to the farmers.

Table 4: Strategies to curtail challenges encountered during the tilling stage

Coping strategies	Frequency	Percentage
Join cooperatives for access to credit facility to expand farm	340	89.5
Competency technical know-how of improved Acha farming practice	284	74.7
Proper planning for land acquisition	104	27.4
improving knowledge of climate condition	108	28.4
Adequate security measure to prevent kidnapping and theft	28	7.4

Table 4 shows the result on coping strategies employed by farmers to mitigate the challenges during farm tillage for Acha cultivation where 89.5% (340) Join cooperatives for access to credit facility to expand farm, 74.7% (284) applied competent technical know-how of improved Acha farming practice, 28.4% (108) improving knowledge of climate condition, 27.4% (104) adopted proper planning for land acquisition while 7.4% (28) used adequate security measure to prevent kidnapping and theft.

Tilling is a crucial stage in Acha farming, as it prepares the soil for planting, incorporates organic matter, and helps break up compacted soil to improve aeration and water infiltration. However, there are several challenges that farmers encounter during the tilling stage. Acha farming is often practiced in regions with low soil fertility and high rainfall. As a result, soil erosion is a common problem during tilling. To prevent soil erosion, farmers use conservation tillage techniques such as

minimum tillage, zero tillage, or direct seeding. These techniques help to retain crop residues on the soil surface, which reduces soil erosion and improves soil health and improve crop yield.

Table 5: Strategies used to curtail challenges encountered during Acha planting

Coping strategies	Frequency	Percentage
The use of insecticide to control the insects/pests/rodents	336	88.4
The use of selective herbicide for weed control	356	93.7
The use of cooperative labour to reduce cost	120	31.6
The use of land used for potatoes to reduce cost of manures	160	42.1
Adequate knowledge of planting equipment	254	66.8

Result presented in Table 5 shows the coping strategies employed by farmers to mitigate the effects of challenges faced during Acha planting. The result shows that 93.7% (356) of the respondents used selective herbicide for weed control, 88.4% (336) used insecticide to control the insects/pests/rodents, 66.8% (254) applied adequate knowledge of planting equipment, 42.1% (160) use land previously used for potatoes to reduce cost of manure while 31.6% (120) used cooperative labour to reduce cost.

In agreement with this finding, Ajeigbe, et al., (2016) admitted, that the use of insecticides to control pests and rodents in Acha farming can be an effective way to manage crop losses and increase yield. Insecticides are chemicals that are specifically designed to kill or control insects, and they are applied to crops in various ways, including as sprays, dusts, and granules. In addition to insecticides, farmers in the study area also use other methods as coping strategies to improve land fertility, such as crop rotation, intercropping, and biological control.

Table 6: Strategies used to curtail the challenges encountered during the weeding stage

Coping Strategies	Frequency	Percentage
Prompt picking of weed from the farm	120	31.6
Use of cooperative labour for weeding	364	95.8
Adequate knowledge of selective herbicide application	116	30.5
Weeding after rain to prevent immediate growth of weed	132	34.7

Source: Field Survey, 2022

Result presented in Table 6 shows the coping strategies employed by farmers to mitigate the effects of challenges faced during weeding of Acha farm where 95.8% (364) of the respondents used cooperative labour for weeding, 34.7% (132) weed after fresh rainfall to prevent immediate growth of weed, 31.6% (120) promptly remove the weeds from the farm as they sprout while 30.5% (116) employed adequate knowledge of selective herbicide application. These findings implied that the use of cooperative labour for weeding is a popular coping strategy used by majority of the farmers to cope with the challenges faced during weeding of Acha farm in the study area.

This finding corresponds with the study of Angarawai (2017), who reported that apart from herbicides, farmers also use manual labour to control weeds. Cooperative labour can be utilized to manually weed Acha farms, which involves physically removing weeds by hand. This method can be effective in managing weeds, especially in small-scale farming systems.

Hypothesis of the study

There is no significant relationship between challenges faced and the coping strategies employed by Acha farmers in Plateau State.

Table 7: There is no measurable correlation between the strategies devised by Acha farmers and the challenges they face in Plateau State

Correlations			
		Challenges	Strategies
Challenges	Pearson Correlation	1	1.86
	Sig. (2-tailed)		.045
	N	190	190
Strategies	Pearson Correlation	.043	1
	Sig. (2-tailed)	.045	
	N	190	190

In Table 7, the hypothesis being made is that there exists no measurable correlation between the coping strategies devised by Acha farmers and the challenges they encounter in the study area. The Pearson Correlation coefficient between Strategies and Challenges is 1.86. This indicates a positive correlation, meaning that there is a strong positive relationship between the strategies devised by Acha farmers and the challenges they face. The significance level (Sig. or p-value) is 0.045 for this correlation. In this case, the p-value is lesser than 0.05, specifically 0.045. This suggests that the observed correlation between strategies and challenges is statistically significant at the conventional significance level of 0.05. These strategies are directly related to the challenges Acha farmers face along the value chain. The findings from the study strongly support the assumption that there is a measurable correlation between the strategies devised by Acha farmers and the challenges they face in Plateau State. The positive correlation coefficient and statistically significant p-value suggest that as challenges increase, farmers are actively devising and implementing strategies to address those challenges. These strategies encompass a range of approaches including climate knowledge utilization, cooperative structures, diversification, market-related tactics, and resource optimization.

CONCLUSION AND RECOMMENDATIONS

The study delved into the coping strategies employed by Acha farmers to address challenges at cultivation stage in the study area. The findings showed that Acha farmers in Plateau state are confronted with myriad of challenges while cultivating the crop. Challenges ranging from lack of enough credit facility to expand farm, difficulty in accessing quality seed, climate change to high cost/ inadequate labour are prevalent in the study area. The result of this study however revealed that majority of the respondents possess crucial knowledge which are employed in mitigating farming difficulties. These include Joining cooperatives for access to credit facility to expand farm, prompt purchase of high yield seeds, the cultivation of land used for potatoes to reduce cost of manures and use of cooperative labour for weeding, among others.

The study recommended that government, non-governmental organizations and individuals to encourage the formation of informal rural financial institutions in the rural communities which may enhance the reach of the Acha farmers to financial services. Farmers are also encouraged to form groups to link up with the elite in their enclaves that could enhance their access to extension services so as to bolster training and extension programmes for Acha farmers.

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