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BARRIERS IN IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION STRATEGIES AMONG SMALLHOLDER FARMERS IN SEMI-ARID AREAS OF IRINGA DISTRICT TANZANIA

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ABSTRACT

This paper explored barriers that hinder effective implementation of climate change adaptation strategies. Two divisions namely; Ismani and Pawaga in Iringa district were purposeful selected. A cross sectional research design was used. A multistage sampling procedure was employed to select divisions, wards, villages and households. Wards, Villages and household were selected randomly whereby a sample of 240 household respondents was obtained. Quantitative data were collected through household survey whereas qualitative data were gathered through focus group discussion and key informant interview. Quantitative data were analysed descriptively statistics using Statistical Package for Social Sciences (SPSS) while qualitative data were analysed using content analysis. The findings revealed several barriers to smallholder farmers' adaptation strategies. Such barriers were unreliability of weather forecast information, lack of access to agricultural extension services, and lack of access to water for irrigation. Other barriers were lack of financial sources, lack of access to affordable credit institutions, lack of farm assets and cost of agricultural inputs. The findings also revealed that there were relationship between age, income and barriers to adaptation strategies. Existence of those barriers hinders effective implementation of adaptation strategies in the study area. The government and other stakeholders should facilitate adaptation by enabling farmers to overcome barriers reported in this study.

Key words: Climate change, barriers, adaptation strategies, semi-arid areas, Tanzania

1. INTRODUCTION

The ongoing changes in global climate conditions are exposing communities to ever increasing risk threatening sources of livelihood especially in developing countries (Hisali *et al*., 2011). Climate change impacts are being felt today and greater impacts are unavoidable tomorrow (Legesse *et al*., 2012). Previous studies show that the impact of climate change can be significantly reduced through adaptation Strategies (Kurukulasuriya and Mendelsohn, 2006; Seo and Mendelsohn, 2006). However, there are various barriers that impede adaptation strategies, such barriers include; competing priorities that place demand on scarce resources, poverty that limits capacity to adapt, lack of knowledge, weak institutions, degraded natural resources, inadequate infrastructure, insufficient financial resources, distorted incentives and poor governance (Leary and Kulkarni, 2007; Adger *et al*., 2007; Deressa *et al*., 2009; Klean *et al*., 2014). Others are related to technology and culture (Adger *et al*., 2007). These Barriers severely constrain what people can adapt and are observed to adapt against impact of climate change.

The concept of barriers is increasingly used to describe the obstacles that hinder the planning and implementation of climate change adaptation strategies (Eisenak *et al*., 2014). The IPCC fifth assessment report characterizes adaptation barriers (synonymous with adaptation constraints) as "factors that make it harder to plan and implement adaptation actions or that restrict options" (Klein *et al*., 2014). Moser and Ekstrom (2010) define barriers as "obstacles that make adaptation less efficient, less effective or may require changes that lead to higher costs". Generally, barriers to adaptation are defined as challenges, obstacles, constraints or hurdles that impede adaptation. Some scholars like Adger (2009) and Laube *et al*. (2012) use the term 'limits' and 'barriers'

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interchangeably. But more often limits and barriers have different meanings. Barriers are considered surmountable or mutable while limits are seen to be absolute or unsurpassable.

Smallholder farmers in Tanzania including semi-arid areas of Iringa district are adapting against adverse impact of climate change through different adaptation strategies such as planting early maturing maize varieties, planting of drought resistant crops, crop diversification, agriculture diversification, application of irrigation, involving in casual labour, petty business and local brew (Nelson and Stathers, 2009; Lema and Majule, 2009; Shemsanga, *et al.*,2010; Lyimo and Kagalawe, 2010; Mongi *et al*., 2010; Komba and Mchapondwa, 2012; Kihupi *et al*., 2015a). Adaptation strategies are expected to improve smallholder farmers' wellbeing. In spite of all adaptation strategies against impact of climate change carried in semi - arid areas of Iringa district, smallholder farmers especially of Ismani division experience food insecurity. This situation could be partially caused by presence of potentially barriers that hinder effective implementation of adaptation strategies by smallholder farmers in the study area.

Some studies partly focus on barriers to smallholder farmers' adaptation in Tanzania (Slegers, 2008; Paavola, 2008). However, there is little or no empirical evidence that shows specific studies focused on barriers of smallholder farmers' adaptation to adverse impact of climate change in semi-arid areas of Iringa district. With consideration that policies, programs and measures designed to overcome barriers to adaptation need to be context specific (Matasci *et al*., 2014), this study explored barriers to adaptation strategies of smallholder farmers in the afore mentioned district. It specifically answers the following questions; what are barriers of effective implementation of adaptation strategies? How are the barriers affecting adaptation strategies of smallholder farmers against impact of climate change? And what is the association between barriers to adaptation strategies and socio-economic characteristic of households.

This study is in line with the National Adaptation Programme of Action (NAPA) (URT, 2007), which calls for identification of immediate and urgent climate change adaptation actions that are geared toward long-term sustainable development. Identification and ensuring of climate change adaptation on its own right is not enough without addressing the constraints in the practical operationalisation of the adaptation actions. This study will contribute in making adaptation strategies effectively implemented specifically to smallholder farmers.

2. METHODOLOGY

The study was conducted in Iringa district in Iringa region, Tanzania. The District is one of the four districts of the Iringa region. Iringa district has six administrative divisions. Two divisions namely Ismani and Pawaga out of six were selected for the study based on their climatic condition. The area (Ismani and Pawaga) is semi-arid with low mean rainfall ranging from 500 – 600 mm. Temperature in Pawaga divisions is over 25 ^{0}C while in Ismani is between 20 – 25 ^{0}C (Mussei *et al.*, 2012).

The rationale for choosing Iringa district for the study is twofold. First, Iringa district was one of the districts in Iringa region which produces surplus maize, Ismani division being one of the major producers. Currently, the area especially Ismani and Pawaga divisions experiences recurrent drought conditions, leading to more vulnerable to impact of climate change than other areas in the region (Mussei *et al.*, 2012). Secondly, like other smallholder farmers in semi-arid areas of Tanzania, smallholder farmers in Pawaga and Ismani divisions use different adaptation strategies against impact of climate change (Kihupi *et al*., 2015a). Adaptation strategies are expected to improve smallholder farmers' wellbeing as well as their resilience against impact of climate change, but it seem to be not effectively implemented given that smallholder farmers especially in Ismani have been receiving food relief frequently from the Tanzania government (Kihupi *et al*., 2015a) even though they apply different adaptation strategies.

A cross – sectional research design was used. The design was suitable because it allowed collection of multiple cases in a single point of time (Babbie, 1990; Bailey, 1998). A multistage sampling procedure was applied to select divisions, wards, villages and then households. This procedure allowed more than one sampling method to be used. Ismani and Pawaga divisions were purposively selected based on their climatic condition (semi-arid).Wards and villages in Ismani and Pawaga divisions were selected randomly. A total of 240 respondents

based on of Cochran's formula were drawn randomly so that each individual household had an equal chance of being selected (Cochran, 1977).

Quantitative and qualitative data were collected. Quantitative data were collected through a household survey. A tool for this method was a questionnaire. The questionnaire was pre-tested in Lwang'a village, Ismani division and revised to produce the final questionnaire that was administered to heads of household smallholder farmers. Information on barriers to adaptation against adverse impact of climate change by smallholder farmers was gathered through this method. Qualitative data on barriers to adaptation strategies were gathered through focus group discussion whereby two groups of seven to twelve participants (selected purposeful) per each village were conducted and key informant interview (that included experienced smallholder farmers in terms of years of working in farm and extension agricultural officers) methods. A multiple response, cross tabulation and correlation was carried out using a Statistical Package for Social Sciences (SPSS) in the analysis of quantitative data. Qualitative data were analysed using content analysis whereby qualitative data coding and conclusions were drawn based on themes of the study.

3. FINDINGS AND DISCUSSIONS

3.1 Barriers to Adaptation Strategies

3.1.1 Limited of access to affordable credit institution and lack of financial resources

Limited access of financial resources constrained adaptation strategies in the study area; about 97% of respondents (Table 1) argued that lack of financial resources was one of the major constraints to adaptation against adverse impact of climate change. Although the study area had credit institutions like FINCA, PRIDE and SACCOS, 78% of respondents (Table 1) mentioned lack of access to credit as one of the barriers to adaptation against impact of climate change. During focus group discussion and key informant interviews, it was revealed that most of the credit institutions in the area had high interest rates. One participant made the following comment (which was echoed by most of participants) during the Focus Group Discussion in Nyang'oro village, Ismani Division:

> "*The interest rate is high therefore we are afraid of the risk of our land being confiscated whenever we fail to pay back the loan. There are some villagers whose land has been confiscated as they failed to pay back the loan and now they have no land to cultivate*."

This implies that having credit institution in the area does not mean access to those credit institutions. Therefore, credit institutions should aim at helping these smallholder farmers by putting affordable interest rate. Low interest rate will enable small holder farmers involve in different adaptation strategies against adverse impact of climate change such as buying agricultural inputs, farm assets and diversifying their livelihood activities.

Table: 1 Barriers to Adaptation Strategies (n = 240)

Barriers	Frequency	Percentage
Lack of capital	233	97.1
Lack of access to affordable credit Institution	188	78.3
Lack of access to water for irrigation	171	71.2
Lack of access to agricultural extension services	156	65.0
Cost of inputs	156	65.0
Lack of farm assets	147	61.2
Unreliability of weather forecast	142	59.2

The findings revealed that, 82% of respondents who had no access to affordable credit institution did not practice irrigation farming. This may be due to the fact that, having access to credit institutions can help respondents in buying pumps and other irrigation facilities especially those who have access to water for irrigation. This means lack of affordable credit institutions impeded increased use of irrigation as one of the strategies against impact of climate change. The findings also revealed significant relationship between lack of access to affordable credit institutions and involving in petty business adaptation strategy. About 85% of respondents who had no access to credit institutions were not involved in petty business. This implies that lack of access to affordable credit institution impede smallholder farmers to involve in petty business as one of the

strategies against impact of climate change. The findings in this study are in line with previous studies (Deressa *et al*., 2009; Dungumaro and Hyden, 2010; Aquah and Onumah, 2011; Maponya and Mpandeli, 2012) done in Nile basin of Ethiopia, Tanzania, Ghana and South Africa that reported, availability of financial resources and access to credit helps smallholder farmers to diversify their livelihood strategies like getting involved in non-farm activities such as petty business so as to overcome adverse impact of climate change.

3. 1.2: Lack of access to water for irrigation

Lack of access to water for irrigation was mentioned as a barrier to adaptation strategies by (71%) of respondents (Table 1). As expected, (96%) of respondents (Table 2) who had no access to water for irrigation were not involved in irrigation agriculture. This implies that lack of access water for irrigation hinders the possibility of optimising irrigation agriculture strategy. Since semi-arid areas of Iringa district experiences frequent drought condition and long dry spells during crop growing season, thus water for irrigation could have supplemented inadequate rains. Smallholder farmers also could have made the best use of irrigation agriculture, hence, increasing food security and their income. The findings are similar to those of a study by Acquah and Onumah (2011) in Ghana who argue that having no access to water for irrigation constrains irrigation being one of adaptation strategies.

Table 2: Adaptation strategies and its Barriers (n = 240)

Variables	Percentage	X^2	P-value
Lack of access to affordable credit Vs irrigation	82.1	5.138	0.024
Lack of access to affordable credit institution Vs involvement in petty business	85.3	4.321	0.038
Lack of water for irrigation Vs irrigation	96.5	$1.934*10^2$	0.000
Lack of access to agricultural extension services Vs planting of early maturing maize varieties	90.4	30.465	0.000
Lack of access to agricultural extension services Vs planting of drought resistant crops	90.6	25.19	0.000
Lack of access to agricultural extension services Vs crop diversification	89.8	21.244	0.000
Lack of agricultural extension services Vs agricultural diversification	78.1	6.909	0.009
Lack of agricultural extension services Vs change in planting dates	84.8	15.764	0.000
Lack of agricultural extension services Vs application of fertilizer	76.3	18.404	0.000

3.1.3 Lack of access to agricultural extension services

The findings revealed that 65% of respondents (Table 2) observed that lack of access to agricultural extension services affected effective implementation of various adaptation strategies against impact of climate change. Those adaptation strategies were; planting of early maturing maize varieties, planting of drought resistant crops, crop diversification, agriculture diversification, change in planting dates and application of fertilizer. It was revealed that 90% of respondents (Table 2) who had no access to agricultural extension services had not adopted early maturing maize varieties.

It was also revealed that, about 97% of respondents (Table 2) who had no access to agricultural extension services had not adopted drought resistant crops. Similarly, about 89% of respondents (Table 2) who had no access to agricultural extension services had not adopted crop diversifications as one of the strategies against impact of climate change.

The findings also revealed that 78% of respondents (Table 2) who had no access to agricultural extension services had not adopted agricultural diversification (i.e. practicing both livestock keeping and crop production) as one of the strategies against impact of climate change. Likewise, about 85% of respondents (Table 2) who had no access to agricultural extension services had not adopted change in planting date as one of the adaptation strategies against impact of climate change.

It was also revealed that 76% of respondents (Table 2) who had no access to agricultural extension services had not adopted application of fertilizers as one of the strategies against impact of climate change. It was expected that, farmers with access to extension services will be more likely to adopt different strategies, since they will have more knowledge of adaptation strategies to address climate change. Therefore, lack of access to

agricultural extension services hindered effective implementation of various adaptation strategies against the impact of climate change. A study by Gbetibouo (2009) along the Limpopo River in South Africa revealed that access to extension services in rural areas increases the likelihood of adopting to different adaptation strategies. Deressa *et al*. (2009) revealed that having agriculture extension services increases the likelihood of using different crop varieties and other adaptation strategies against climate change.

3.1.4 Cost of agricultural inputs

Majority (65%) of the respondents (Table 2) reported that high cost of inputs (seeds and fertilizer) hindered adaptations. Although the government of Tanzania subsidizes smallholder farmers through agricultural inputs, majority of smallholder farmers in the study area during focus group discussion said that the inputs price was still high. It was revealed that majority of smallholder farmers do not buy the hybrid seeds but use seeds collected from part of previous harvest of early maturing maize variety. This implies that adaptation of hybrid early maturing maize varieties as a means to overcome impact of climate change was restrained by cost of inputs. This could be partly a reason for smallholder farmers in Ismani division harvesting low yield although most of them claimed to have adopted early maturing maize variety. Based on maize harvested in Ismani 2013, the mean harvest of respondents' maize was 2.5 bags per acre (each bag weighs 115kgs). According to the agricultural extension officer of Uhominyi village in Ismani division, farmers who apply fertilizer and plant in time and who use early maturing maize varieties are expected to harvest eleven to twelve bags of maize per acre.

3.1.5 Lack of farm assets (tractors and oxen driven plough)

About 61% of respondents (Table 2) said that lack of ownership of farm assets (such as oxen driven plough and tractors) impeded adaptation especially with the increasing unpredictability of rainfall in the study area. Usually, smallholder farmers in semi-arid areas of Iringa district do timing of rains so as to be sure of harvest (Kihupi *et al*., 2015a). They start planting immediately after the beginning of rains so as to maximize the shortened growing season (Kihupi *et al*., 2015b). Due to lack of ownership of farm assets, they were forced to sow seeds towards the end of rain seasons when owners of farm assets finished preparing their fields. This was revealed during focus group discussion and key informant interviews that the wealthier owners of oxen-driven plough prepare their own fields first thus maximizing the shortened rain season for crop production. This implies that those who did not own oxen driven plough or tractor, cultivate their fields late and this can lead to low harvest due to stunt growth or drying of crops before its maturity. Therefore owning oxen driven plough or tractor is very important in improving smallholders' ability to adapt against impact of climate change. One participant made the following comment (which was confirmed by most participants) during the Focus Group Discussion in Uhominyi village in semi-arid areas of Iringa District;

> "*When it rains, owners of oxen driven plough prepare their fields first, then when the rains stop, these owners of plough work in fields of the other farmers who do not own oxen driven plough for wage so that they can use the money to hire labour for weeding in their fields. At the end of the day plough owners get good harvest while we, non-owners of plough get low or no harvest*".

The above quotation shows that lack of farm assets hindered smallholder farmers from timing rains during rainy season. Hassan and Nhemachena (2008), comment that ownership of farm assets (machinery) improves farmers' ability to adapt.

3.1.6 Unreliability of weather forecast information

The findings from this study revealed that (87%) of respondents received information on weather forecasts from Tanzania Meteorological Agency (TMA) mostly through media such as radio. However, the findings revealed most of information received was not reliable as was reported by 59% of respondents (Table 1). These findings were complemented by focus group discussions and key informant interviews. One participant made the following comment (which was echoed by most of participants) during the Focus Group Discussion in Chamdindi Village, that;

> "*Weather forecasts reports can show that there will be enough rain, and in response to such information we plant our traditional maize varieties that require much rain, but on the contrary, less rain below average is actually received. Sometimes the weather forecast reports predict that there will be scarcity of rain, but on the contrary, it rains a lot*".

From quotation above, unreliability of weather information makes farmers uncertain about appropriate planting dates and affects their decision as to whether or not they should plant early maturing varieties. These findings are similar to those of Okonya *et al*. (2013) who uncovered that most farmers in Uganda had no confidence in the weather forecasts received because they were unreliable. The findings are likewise similar to those of Penaranda *et al*. (2013) who reported that farmers in Kwamankese district, central region of Ghana, do not trust the weather forecasts reports because they are not reliable. Accessibility to climate change information and timely weather forecasts is critical to assist farmers in timing the planting period to coincide with onset of the rains (Simbarashe, 2013). Therefore, provision of reliable weather forecasts reports will enable farmers to fully exploit seasonal rainfall distribution to improve and stabilize crop yields. In other words, unreliable weather forecast is an obstacle to smallholder farmers in their implementation of adaptation strategies.

3.2 Adaptation Strategies and Households Socio-Economic Characteristics

The findings revealed that there were associations between socio-economic characteristics of respondents and barriers to adaptation strategies. Those socio-economic characteristics of respondents that showed associations with barriers were age and income of household head. Barriers associated with those socio-economic characteristics of household were farm assets (oxen-driven plough and tractors) and cost of inputs.

3.2.1 Age of household head

A spearman's rho correlation coefficient was computed to assess the relation between age of the household head and ownership of farm assets (level of measurement of age was ratio and farm assets was dichotomous). There was a negative correlation between the two variables, ($r = -0.167$, $n = 240$ $p = 0.01$) (Table 3). This means that increase in years of the household head was correlated with decrease in ability of acquiring farm assets. This implies that as an individual becomes old, the ability to work becomes low as a result cannot be able to acquire farm assets. Therefore lack of farm assets being one of barriers to adaptation strategies is more likely to be a barrier to old smallholder farmers than young and energetic smallholder farmers. A spearman's rho correlation coefficient was also computed to assess the relation between age of the household head and affordance of cost of agricultural inputs. There was no statistical significant association between the two tested variables. It was hypothesized that as an individual becomes old, the ability to work becomes low as a result he/she cannot be able to afford cost of agricultural inputs especially in rural context due to the fact that rural smallholder farmers do not have saving and their survival depends on their energy.

3.2.2 Income of head of household

A spearman's rho correlation coefficient was computed to assess the relation between income of the household head and owning of farm assets. There was a positive correlation between the two variables, ($r = 0.201$, $n = 240$, $p < 0.01$) (Table 3). This means an increase in income of the household head was correlated with increases in ability of the household head to acquire farm assets (e.g. tractor or oxen driven plough). A spearman's correlation coefficient was also computed to assess the relation between income of the household head and cost of input. There was also a positive correlation between the two variables, ($r = 0.389$, $n = 240$, $p < 0.001$) (Table 3). This means an increase in income of the household head was correlated with increases in ability to afford the cost of agricultural inputs. This implies that as ones income increases, he/she will be able to own farm assets as well as afford cost of agricultural inputs. This is due to the fact that the wealth of this individual will improve hence, enabling him/her to own tractor or oxen-driven plough as well as afford agricultural inputs in rural areas. In other words, well-off smallholder farmers were less likely face lack of farm assets and inability to afford cost of agricultural inputs as barriers. Lyimo and Kangalawes' study (2010) shows that well-off smallholder farmers were able to own tractors and ox-plough.

Table 3: Relationship between Socio-economic Characteristics and Barriers to Adaptation Strategies (n = 240)

			Age of respondent	Education of respondent	Sex of the head of household	Marital status of respondent	Income of respondent per month
Spearman's rho	owning of farm assets	Correlation Coefficient	-.167**	.075	.001	.034	.201**
		Sig. (2-tailed)	.010	.246	.986	.596	.002
		N	240	240	240	240	240
	agricultural inputs	Correlation Coefficient	-.123	.119	.032	.012	.389**
		Sig. (2-tailed)	.057	.065	.626	.849	.000
		N	240	240	240	240	240

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3.2.3 Education of household head

A spearman's rho correlation coefficient was computed to assess the relation between education of the household head and owning farm assets. Although level of education has influence on adopting adaptation strategies (Deressa *et al*., 2010), the findings revealed no statistically significant association between the two tested variables (Table 3). This means that the level of education of the household head had no correlation with ability of the household head to acquire farm assets. This may be due to the fact that majority (83%) of respondents are standard seven level. A pearson product moment correlation coefficient was also computed to assess the relation between education of the household head and cost of input. The findings also revealed that there was no statistically significant association between the two tested variables (Table 3). This means the level of education of the household head had no correlation with ability of the household head to afford cost of farm inputs. Therefore, level of education of household head has no relation with lack of farm assets barrier and has also no relation with inability to afford agricultural inputs barrier.

3.2.4 Sex of the household head

A spearman's rho correlation coefficient was computed to assess the relation between sex of the household head and owning farm assets. Although male headed household has high probability of adapting to adaptation strategies (Deressa *et al*., 2010), the findings revealed no statistically significant association between the two tested variables (Table 3). This means sex of the household had no correlation with ability of the household head to acquire farm assets. This is contributed by having majority of respondents (82%) being male. A spearman's correlation coefficient was also computed to assess the relation between sex of the household head and ability to afford cost of agricultural inputs. The findings revealed no statistically significant association between the two tested variables (Table 3). This means sex of the household head had no correlation with ability of the household head to afford cost of agricultural inputs. Therefore sex of household head had no influence on lack of farm assets and inability to afford agricultural inputs barriers.

3.2.4 Marital Status of the household head

A spearman's rho correlation coefficient was computed to assess the relation between marital status of the household head and owning farm assets. The findings revealed no statistically significant association between the two tested variables (Table 3). This means marital status of the household head had no correlation with ability of the household head to acquire farm assets. A spearman's rho correlation coefficient was also computed to assess the relation between marital status of the household head and cost of input. The findings revealed no statistically significant association between the two tested variables (Table 3). This means marital status of the household head had no correlation with ability of the household head to afford cost of farm inputs. Therefore marital status of household head had no influence on lack of farm assets and inability to afford cost of agricultural inputs barriers.

4. CONCLUSIONS AND RECOMMENDATIONS

Smallholder farmers in semi-arid areas of Iringa district apply various adaptation strategies to overcome the impact of climate change. Such adaptation strategies were planting of early maturing maize varieties, change in planting dates, and applications of fertilizer and irrigation agriculture and non-farm income generating activities. But the study revealed various barriers that hinder those adaptation strategies from being effective. Those barriers were unreliability of weather forecast information, lack of access to agricultural extension services and lack of access to water for irrigation. Other barriers are lack of financial resources, lack of access to affordable credit institutions, lack of farm assets (plough and tractors) and cost of agricultural inputs. The findings also revealed that there is relationship between socio-economic characteristics of households and barriers to adaptation strategies. Existence of these barriers has impact on effective implementation of adaptation strategies against impact of climate change.

Government and other stakeholders should facilitate adaptation by enabling farmers to overcome barriers reported in this study. Specifically policies should ensure that farmers have access to affordable credit institutions which would give them greater flexibility to modify their production strategies in response to climatic change. Funds are needed to empower the local community to adapt to climatic change. Access to water for irrigation increases farmers' resilience to climate variability and change, then greater investment in irrigation is needed. Extension services need to be expanded with highly qualified personnel so as smallholder farmers should have reliable knowledge on adaptation strategies against adverse impact of climatic change.

Tanzania Meteorological Agency (TMA) should ensure smallholder farmers receive reliable and up-to-date information about rainfall patterns in forthcoming season. This will help smallholder farmers to make well-informed regarding decision on their planting dates. Though the government of Tanzania subsidizes its smallholder farmers, still the input cost seems unaffordable to many smallholder farmers in semi-arid areas of Iringa district. Therefore, the government should provide the subsidies basing on smallholder farmers' financial situation.

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