

Text box 1

“it is not everything that is taught by the agriculture extension people or the NGO, that is good. Some are good and some are very bad, so we pick and choose which one applies to us and leave the rest. They know that some of our innovations and production system works very well than theirs, but because somebody gave them money, they will promote those people's interest. Our values and ethics about nature feed directly into our perceptions, our perceptions feed into our beliefs, our beliefs feed into our spirituality, our spirituality feeds into our needs as farmers and all these leads to our norms and cosmovision. Our norms and cosmovision feed into our indigenous knowledge and production system. The knowledge system of us as smallholder farmers informs our decision as to which production system to adopt or not to adopt. We often go through trials and a series of experiments to ascertain the workability, applicability and consistency of some claims about a particular technology or the otherwise of it. This explains our survival strategies (Resilience) us smallholder-farmer”.

Again, the finding and the position of ALHAJI MBILLA is supported by Warren and Jiggins (1989) cited in Millar (2018) that some Indigenous knowledge systems and innovation are not some times recognized by some researchers and development agents although traditional agricultural technologies and innovations may be as good as or even better than the modern/western agricultural technologies

Indeed, the above results again tend to support the view of Stonehouse (1996) cited in (Knowler & Bradshaw, 2007) and others who advocated for location-specific approach and holistic approaches to promoting conservation agriculture whereby policy mechanisms such as grants, extension services and locally tested and working agricultural technologies are geared towards a

particular local or preferably to individual farmers and their farm operations (ECAAF, 2001). Furthermore, the finding is supported by Millar's (2018) constellations of the cosmovision model. It is a prominent theory derived from Millar's paradigm of African sciences. The model is built on the conviction that cosmovision dictates the way resources (land, water, plants and animals) are used, how decisions are taken, and how problems are solved among rural communities (Millar, 2018)

3. The study found that farmers' perceptions about CA influence their adoption in the study area.

Some of the farmers' perceptions in the study area include;

"Crops Residue/biomass breed reptiles"

"Not all agricultural technology innovations are applicable in all areas hence 'we pick and choose' (partial adoption) or adaptation.

"Some of us have to always consult our ancestors before adopting new agriculture innovations"

"I will prefer to always burn the residue and carry manure to my farm, it is the same as CA. What the crop residue will do when it gets rotten, the manure will do the same thing".

This finding is supported by the study of Brown et al. (2017). They found that an important restriction towards the adoption of CA practices concerns farmers' perception, low feasibility studies, hesitations regarding the relevance and benefits of these practices. An example is the management of crop residues. Farmers have firm convictions about the usefulness of burning crop residues in some areas in SSA (Ngwira, Thierfelder & Lambert, 2013) and even in Ghana for pest control and soil fertility reasons. It would require an important change in farmers' mentality to enable a holistic change that will favour longer-term and higher-level benefits such as carbon sequestration.

4. The study found that adoption of CA goes beyond agronomic practice to include the issues of spirituality as shown in the above text box below

BOX 2

"My name is Akurugu Azuma 45 years old. I am a farmer in Geru here, I have been Farming since childhood. 10 to 15 years ago we were introduced to this (CA) type of farming by the Presby. Agric. research station and some of my colleagues didn't like the idea because it came close to the farming season. 'You don't use your only small piece of land and play games' but to me, it was similar to what our great grandfathers were doing their farming. The Agric/NGOs people said, we should not clear the land and burn the rubbish (residues) but we should just plant like that. I and my Husband tried to know more about it. We tried it for five (5) years, the first time, in several years that we didn't clear the land. For two years it worked. One day I was working on the farm and my little boy was also playing, he was running in and out of the residue and had a snake bite, I sent him home and quickly went to the hospital and unfortunately, the child died. My husband went to the soothsayer to consult and the Soothsayer said 'we didn't consult or get permission from his (my husband) grandfather before accepting that farming method. The soothsayer recommended some Sacrifices which we did but since then, for the remaining four years anytime we use this Farming method, we are always getting problems so my husband asks us to stop, though the yield was always good and we didn't spend much to plough".

This finding is consistent with Millar et al (2012) ED Model where apart from material and social, spirituality also influence farmer decision making processes and their development. "Some of us have to always consult our ancestors before adopting new agriculture innovations". This implies that the cosmovision of the smallholders' farmers in the Bawku Municipality dictates their decisions in production processes and resource usage. This finding is consistent

with the Millar et al (2012); Millar (2004; 2018.) constellations of the cosmovision model. The model is built on the conviction that cosmovision dictates the way resources (land, water, plants and animals) are used, how decisions are taken, and how problems are solved among rural communities. Adoption of Agricultural Technology goes beyond the physical, socio-economic, and institutional to spiritual. "For the traditional people in Northern Ghana, gods, spirits, Ancestors, spiritual and political leaders, sacred groves, land shrines, ritual crops and animals, food items and cash crop are all interrelated" (Millar, 2004). This is particularly applicable to smallholder farmers in Bawku Municipality.

5. The study found that CA adoption is preceded by testing and experimentation.

BOX 3

Qn. "Did you leave crops residue in your farm or burn them"? I ask.

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Hmm, this is a serious question, if it were the agric. People I will lie to them but for you, I know you, so I will tell you the truth though the NGO People say we shouldn't Burn I gather all and burn before the rains start. If you tell the NGOs the truth they will not call you for a meeting again or give you their support.

Qn. "why did you bum?" I asked again, it is not everything that people tell you that you must do or follow, for example trying out which crops varieties could do well on your farm and which farming method to use takes time. Qn. He asks me, 'did you know Nara' Ans. yes, I responded, if you plant early alone and it matures at the time your colleague farmer own hasn't mature wouldn't birds finish them?

Yes, they will, I responded. But when we plant at the same time as recommended by the 'Bookmen', though births will come they cannot destroy them because you are many the

problems of dry and Storage will come. After all, early planting will mean Maturing at the same time while the rains are still on.

So we farmers are trying with various planting times until we get what we want (appropriate time)

I burn the crop residue because it gives me a lot of problems.

Qn. How I asked? Ans. It produces and serves as safe heavens for snakes, termites and other insects that destroy our crops.

This finding is consistent with the finding of Loevinsohn et al. (2013) cited in Udimal et al. (2017) and Millar's (1996, 2018) farmer experimentation model.

6. The study found that crops residues that should be kept as an integral part of CA are used for alternative purposes eg firewood, animals feed and cash purposes.
7. Again, the study found that "The crops Residues also breed insects that end up infesting our crops and destroying them"

The findings in 6, and 7 are proof in the text box 4 below

BOX 4

Qn. Why don't you leave permanent crop residue on your farm?

"My name is Memuna Halidu 37 years from Sagabo Bawku. I have been Farming before I got married and my husband is a Farmer too, so we are all farmers. This CA method was introduced to us by the Advanced office people (NGO). They showed us pictures of how it is used elsewhere and 'said when you use that farming method you will get more yield and you will not also be buying Fertilizer and paying bullocks to plough for you all the time. We didn't

even have bullocks, so my husband and I wanted to know how true it was, so we accepted to try it on our farm. We didn't plough the land, we just planted the maize like that after using 'condemn' a glyphosate base agrochemical (weedicide/herbicide) to spray the grass and plant maize, after one week, we planted Soyabean inside (inter-crop). We didn't spend so much on the land preparation because we didn't hire bullocks. Though the maize yield did not change the Soybeans did well and we also weeded once, so when you add the maize and the soya yield, it is high, so we have been using that method. But our only problem about it is that we don't have animals but our neighbours had, so when we leave the maize stalks on the farm during the dry season when there is no grass for the animals to feed, they will go and eat everything in your farm.

Again, some of my colleague Women colleagues women are lazy and don't want to go far away and look for firewood, they will also go and collect the remaining stalks we decided to always collect everything after harvest so that if they want, we will sell for them Instead of allowing their animals to go and eat for Free"

The above findings are supported by Farooq and Saddique (2014), Who found that crops residues have alternative uses and care must be taken to preserve if CA will succeed.

Further still, Pest and insects management is often not considered as a determining factor in CA adoption studies but the analysis from the text box above shows how other reasons could influence farmers' decision on adoption

Conclusion

The study concluded that indeed Farmers' indigenous knowledge, perceptions and source of knowledge influence the adoption of CA in the Bawku Municipality.

Recommendation:

Promoters, researchers and other relevant bodies should make use of relevant farmers' knowledge, perceptions and experiences in other to increase CA adoption.

5 Contributions of the Research

5.1 Contribution to New Knowledge

The research discovered an Indigenous Knowledge (IK) or Indigenous Innovation (II) in the Bawku Municipality for fighting fall Army Worm called 'Dimongso'. This is one of its kind in the quest to use local innovation in the fight against the armyworm pandemic

5.2 Contribution to Definition of CA

CA is any production system that allows the current generation to explore the environment for their production needs without compromising the environment for the future production needs of the younger/unborn generation.

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