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CONVERTING AQUATIC WEED INVASION IN IRRIGATION SCHEMES INTO AN OPPORTUNITY TO LIVESTOCK FARMERS IN NORTH EASTERN NIGERIA¹.

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Abstract

Invasion of cattail (*Typha* spp) weed in channels, rivers, and agricultural lands of Hadejia Valley irrigation schemes in northern Nigeria has become an environmental challenge with important social and economic implications for local communities that depend on agriculture and livestock for a living. This aquatic weed blocks canals impeding water flows, reduces productivity in rice lands, and hinders boating and fishing activities. It also crowds out plants, decreases diversity and promotes persistence of waterborne diseases.

Communal and government efforts to eradicate this invasive plant are costly and have had little impact. In this context, the goal of this research is to convert this threat into economic opportunities to improve livelihood of local communities. Specifically, the project seeks to develop and implement a novel technology that use the weed for the production of biogas and silage for animal feed based on a model of natural microorganism. Hence, this is a multifaceted proposal with important environmental and socio-economic impacts occurring both at local and global scale.

The implementation approach is based on action research where participation and engagement of potential beneficiaries and other stakeholders has a pivot role since the very beginning of the project and is considered key to project success. Action research, also known as participatory research or collaborative inquiry, motivates people to more willingly apply what they learn when they do it themselves. It aims to turn local community members into co-researchers to give input and help solve perceived and specific problems that are affecting them every day. To this end, a participatory approach was conducted through focus group discussion with potential direct beneficiaries. The project was presented to stakeholders and a discussion session was then guided with seven simultaneous focus group discussion through a dynamic participatory approach to identify barriers, constraints and opportunities for successful project development. Particular emphasis was given to participation of women.

Focus groups discussions were oriented with a semi structured survey to assess potential demand for the novel use of *Typha* silage for animal feed and to define strategies and incentives to promote adoption. Our findings reveal that focus group discussion is a useful tool to engage potential beneficiaries in the early stages of the project and also ensures that local constraints and bottom-up ideas are considered in product development and technology adaptation phases of the project. As a result, recommendations to promote, facilitate and speed-up adoption were established. Preliminary results reveal this is a multifaceted proposal with important environmental and socio-economic impacts occurring both at local and global scale.

Key words: sustainable development, small-scale livestock, focus group, farmers' perceptions, willingness to adopt.

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Introduction

Irrigation schemes are promoted as a means to spearhead economic development in less developed regions which are highly dependent on farming. This is the case of northern Nigeria that holds one of the largest poor population in Africa and are highly depend on natural resources. However, invasion of cattail (*Typha spp*) weed in channels, rivers, wetlands and agricultural lands has become an environmental challenge with important social and economic implications for local communities that depend on agriculture and livestock for a living. This aquatic weed blocks canals impeding water flows, reduces rice productivity, and hinders boating and fishing activities. Furthermore, dramatic invasion of cattail exacerbates the risk of floods and is associated with higher incidence of malaria and waterborne diseases (Ahmed et al 2017, Birnin, 2008, Chiwaula, et al 2009, Kaugama et al 2016, Salako et al 2016, Tafida et all, 2016).

Communal and government efforts to eradicate this invasive plant are costly and have had little impact (Ringim, 2015). In this context, Typha Project aims at converting this threat into economic opportunities to improve livelihood of local communities. Specifically, the project seeks to develop and implement a novel technology that uses the weed for the production of silage for animal feed based on a model of natural microorganism fermentation. The implementation approach is based on action research where participation and engagement of potential beneficiaries and other stakeholders has a pivotal role since the very beginning of the project and is considered key to project success. Hence, the objective of this work is to assess farmers' perceptions on Typha silage use, identify barriers and constraints to adoption and obtain feedback to improve project development and implementation.

Methodological approach

Action research, also known as participatory research or collaborative inquiry, motivates people to more willingly apply what they learn when they do it themselves. It aims to turn local community members into co-researchers to give input and help solve perceived and specific problems that are affecting them every day. To this end, a participatory approach was conducted through focus group discussion with potential direct beneficiaries. The project was presented to stakeholders and a discussion session was then guided with seven simultaneous focus group discussion through a dynamic participatory approach to identify barriers, constraints and opportunities for successful project development. Particular emphasis was given to participation of women.

A total of 69 farmers, both women and men, participated as potential beneficiaries to assess the novel use of Typha silage for animal feed. Due to cultural reasons women and men were split in different groups. Thus, a total of 31 participating women were organized in 3 focus groups, with 9-13 participants in each one, while a total of 38 men participated forming 4 groups with 8-12 members in each group.



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Focus groups discussions were guided in Hausa during 40-50 minutes and were oriented with a semi structured survey to assess potential demand for the novel use of Typha silage for animal feed and to define strategies and incentives to promote adoption. A literature review of local studies was also conducted to validate and complement results obtained during focus group discussion (FGD)

Preliminary results

All participants in FG agreed that both availability and feed costs are important constraints to local livestock activities, i.e. *“Yes, it is not easily available and tedious to acquire the feed and it is very costly”*. Some participants pointed out that lack of availability meant investing time and money. This finding is in line with Lawal-Adebawale (2012) who also contends that cost of supplementary feeding and non-availability of forage during the dry season challenge efficient livestock feeding and management in Nigeria. According to this author, The poverty status of most livestock farmers limit purchase of supplementary feeding and justify preference for extensive and semi-intensive systems of management. Feed availability and cost animal feed representing about 85% of total cost of livestock production.

In the same strand, the next question for debate inquired whether potential beneficiaries would consider increasing their animal herds. There was large consensus although some precautions were brought up by participants in several groups. The great majority of men and women participants in all focus groups, agreed that they would increase or would consider increasing their livestock size. However, some pointed out that they would do so *“if Typha silage has no ill effect on our animals”*. Several others commented on the need to test and prove no harmful effects for the animals.

The third question in the survey gathered information on how much do they spent to feed their animals during the rainy season. Participants in some of the focus groups noted that feed price was 25-50% lower during the rainy season as compared to the dry season and some participants also remarked that half the quantity was needed since grass was available and animals could graze. In the same vein, other studies point out that forage hardly becomes available during the dry season for consumption of the ruminant which has important implications for rural communities. Since the reared animals cannot survive without food, the implications of dry season feed problem include straying or deliberate guiding of the animals into farms for grazing thus leading to social and sometimes violent conflicts between crop and livestock farmers (Lawal-Adebawale, 2012; Jimoh, 1992).

When asked about feed cost during the dry season all participants discussed considerably higher figures as compared to the rainy season. Some groups reported increases of 25% while other groups reported 50% or even 100% increase. Differences may also be justified given different type of animals, with lower increases associated to poultry. After homogenization of figures discussed in the different focus group, we find that feed cost most often range between 900-1670 Nairas head per month, but in 2 focus group higher figures were discussed amounting to 2000 and even 2500 Naira.



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As to their willingness to adopt new Typha silage use, either by using or making Typha silos at their farm, all participants showed great interest in adopting silage Typha use. Furthermore, both men and women focus groups showed more interested in making Typha silage themselves rather than in buying it in order to save money. Some of the participants in men focus group were very positive about starting Typha silage and being engaged in the project, even without public support i.e. *“Yes, we will make Typha with our own money”*. Interestingly, some participants in a women focus group perceived a business opportunity to sell Typha i.e. *“We would consider to make the Typha ourselves so that we can own business with it”*

Participants in focus groups were also invited to discuss main reasons to adopt and their perceptions on the main advantages of Typha Silage to feed the animals. Most often answer was to reduce costs i.e. *“Reduction in feed price”*, *“it will be more cheaper”*. It was also mentioned that the use of Typha as a feed source save cost and increase the number of animals. One focus group also brought up that new Typha silage would help to reduce nomadism, increase number of animal head and increase growth. Other group declared that this Typha economic use would help curve the menace of Typha and would help to keep water canals open.

Participants were asked to consider how much they would be willing to pay for Typha silage in case they consider to buy. Some of the participants declared they did not know how much to pay, others discussed different figures. In general, differences between focus groups were not very large with four focus groups mentioning price ranges within 2000 and 3000 Nairas per 100 kg bag. Farmers in the other focus group brought up a much lower price of 500 Nairas per bag.

The most important concern mentioned regarding use of Typha as silage for animal feed was that the fear of causing ill to animals while participants in two of the two focus groups also brought up the fear of learning the technology properly. A majority of participants showed great interest in project outcomes, i.e. *“we are ready to cooperate with the project team”*. They also pointed out *“we would be very happy to have this Typha converted to feed for our own uses”* was a consensus conclusion in some of the focus groups.

The last part of focus groups discussion was about actions to facilitate adoption. A list of possible dissemination actions was presented to the groups and all of them were welcomed but ranked with different intensity. Actions of practical training through demonstration units and talks with other farmers that had already used it, where ranked as the most preferred options. Following information on benefits and videos were also considered important. Videos were ranked with little importance by one of the men focus groups.

Finally, the moderators in each focus group gave room for bottom up ideas on actions or suggestions to ease adoption. A men group suggested *“Take some of our farmers to FUGA and ZARIA to be trained on how to make Typha silage and biogas respectively”*. It was also pointed out that *“machines to be used have to be available in the market and affordable”*



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Conclusions

Competing land use and lack of feed constraint the expansion of livestock and become a poverty trap leading to social conflict and increased vulnerability for local communities in irrigation schemes of Northeastern Nigeria. Development and adoption of Typha weeds into silage as feedstock for animals may help to reconcile social, economic and environmental interest. Converting Typha grass into silage would create economic incentives for cleaning water channels or other priority areas as well as controlling the dramatic Typha invasion that has taken place in last decade. The larger proportion of the ruminant livestock in Nigeria lies in the hands of herders who keep them under extensive and semi-intensive management systems, whereby the animals only rely on natural pasture and crop residue for survival. Although ruminants may have access to enough forage during the rainy season; it becomes a great challenge to efficiently feed the animals during the dry season (Lawal et al, 2012, Taiye et al 2017). This justifies the enthusiasm and willingness to adopt revealed by participants in FG. The novel use of Typha silage may open opportunities for livestock expansion and business development and might have a significant impact on human diets, nutrition and household income.

Our findings reveal that focus group discussion is a useful tool to engage potential beneficiaries in the early stages of the project and also ensures that local constraints and bottom-up ideas are considered in product development and technology adaptation phases of the project. As a result, recommendations to promote, facilitate and speed-up adoption were established. In particular, results suggest to pay attention to social capital. Identifying and training leaders who disseminate the silage making process may be an effective way to promote technology adoption. On the other hand, local availability and affordability of materials to make silage is a necessary condition for successful implementation. Lastly, particular focus should be placed on the learning curve. The establishment and management of Typha silage banks in convenient restricted areas operated by more experienced farmers could help to overcome barriers, promote effective learning and benefit from economies of scale and transport. On the other hand, Typha silage making can also open opportunities for local business development.

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