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Pre-extension Demonstration and Evaluation of Hip Pump in Western Oromia, Ethiopia

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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Short Research Article

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ABSTRACT

The method of lifting water to the field for irrigation in Oromia, Ethiopia is mostly traditional. The water is transported to the field with the help of bucket. The ground and river water are at the deeper position and are required to be lifted to the area to be irrigated. Therefore, this research was aimed at pre-extension demonstration of the hip pump. The demonstration was conducted in the West Wollega and Qellem Wollega zones. Totally four farmers' groups were established consisting of sixty farmers. Theoretical and practical training was provided to all farmers' groups' members, subject matter specialists, and development agents. Totally eight hip pumps were distributed for all the four groups. Data were collected through focus group discussions and a semi-structured interview. The collected data were analyzed qualitatively**.** The study recommends that training should be given for extension staffs who work directly with irrigation farmers on the hip pump. Sources of technology should be as close as possible to the farmers. District Irrigation Development Authority should facilitate field demonstrations with farmers who need these technologies by providing these pumps from the sources.

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1. INTRODUCTION

Water lifting devices can be divided into two groups: (i) devises that are run by muscle power of humans or domestic animals and (ii) devices mechanized by lift irrigation techniques. Devices which are run by muscle power are often very time-consuming in real terms, due to their low productivity. Mechanized lift irrigation techniques, while more efficient, need to be adapted to the local conditions and the different demand needs. To establish and implement water lifting devices, local people need to be trained on how to use these technologies in water efficient ways, as well as how to maintain these technologies in the long run [1].

Local hydrogeological, economic and social conditions, as well as national strategies, e.g., the strategy to standardize the equipment, must be considered in selecting the technology which best fits local conditions. In the end, it is the individual farmer or the benefitting association who should make the final choice.

Water lifting technologies free the farmers from the limitations of inadequate rain during dry seasons, thus raising their capacity to grow crops up to two or three planting annually. Thus additional income possibilities for the subsistence economy of the households are provided [2].

In addition, water efficient technologies such as pumps can bring an improvement to the situation of women by increasing household food security and nutritional variety, as well as decreasing the amount of labor required to obtain water. Most pumps can easily be operated by women.

It is estimated that more than 90% of the food supply in Ethiopia comes from low productivity rain-fed small-holder agriculture. Hence, rainfall or access to irrigation water is the most determinant factor affecting the food self-sufficiency at the household level and national food supply. Not only limited access to water has impeded the productivity of farming system but also lack of appropriate means of utilizing the available water more productively [3].

The development of irrigation and agricultural water management holds significant potential to improve productivity and reduce vulnerability to climactic volatility in any country. Although Ethiopia has abundant rainfall and water resources, its agricultural system does not yet fully benefit from the technologies of water management and irrigation. These issues, combined with increasing degradation of the natural resource base, especially in the highlands, aggravate the incidence of poverty and food insecurity in rural areas. Improved water management for agriculture has many potential benefits in efforts to reduce vulnerability and improve productivity [4].

The hip pump can utilize a rowing motion in combination with the rocking of the hip. As the user rock their hip back and forth, their arms are also moving in a circular motion (rowing motion) to operate the piston [4]. Another instance, which can be adopted, involves pushing the pump handle with the rear of the body. This pump can also be used with a hip belt to assist the user with the pulling motion. It is flexible enough to accommodate many different usage styles; the benefit is that it can be used for a long period without tiring and in a manner that is comfortable for different users. In general, this pump is highly energy efficient because a user or community can incorporate the muscle of person's whole body to use the pump. Compared to pumps which use a person's arm to operate this pump enable the community /society to pump for a longer duration since human`s arm have poor endurance as compared to their leg. In particular, the effort to use this pump is substantially less than the effort required to use a similar cylinder and piston pump that does not have a pivoted base-such as a standard floor mounted bicycle pump [5].

This pump is designed for the user to perform basic maintenance with no special skill or tool is required, or furthermore, no special trainer skill is needed to install, to replace, or to operate so that any person can operate easily.

The Hip pump is thus appropriate as it needs low energy and reduces fatigue problem. It is is a light and easy-to-use pressure pump. It has a maximum suction to lift water from 7 meters depth and the maximum pumping height is up to 14 meters [6].

People are catching on to the ways that this technology not only helps them with the problem of a lack of water but also helps them earn a living and improve their happiness in all aspects

of their life. Not only was this equipment supposed to be directly useful in improving irrigation in drought-ridden areas, but it was also going to be very useful in creating a business, employment, and income. This was essential to improving the lives of these rural workers. Since this tool does rely on human power, it is ergonomic and safe.

Many farmers had problems with the inconsistent weather; they were often battling with lack of rainfall and droughts in unproductive lands. The irrigation pump allows them to have consistent water throughout the year, helping the crops and providing income that is more consistent for the families.

The main objectives for this study are:

- ✓ To create awareness among farmers on hip pump technologies.
- ✓ To get farmers feedback for further improvement of the technology.

2. MATERIALS AND METHODS

Material resources supplied were hip pump at the due time of working season.

2.1 Study Area

The project was conducted in West Wollega (Gimbi district) and Qellem Wollega (Sayyo district) where irrigation potential is high and have an easy access for transportation, were purposively selected for the study, with the cooperation of zonal and district irrigation development authority.

2.2 Site and Farmers Selection

The two zones were randomly selected among the mandate area of Bako Agricultural Engineering Research Center. From each zone, one district and among each district two Peasant Association were picked out purposively based on irrigable land and ground/river water facilities possessed. From the identified frame of the sample, a mixture of 15 farmers (by gender & social status) per PA.

Selection of Peasant Association and farmers were made joint venture team composed of the researcher, district officers and locally decentralized institution (Peasant Associations' chairperson).

Totally 60 farmers, 15 farmers from each Peasant Associations, were selected to participate in the pre extension demonstration research.

Training (capacity building) session was an integral part of the project and was organized for farmers, Development Agents, Subject Matter Specialists and other identified stakeholders of the extension area to upgrade their skills on principle, installation (assembling & disassembling), operation(usage), management, handling and repair of delivered pumps.

Moreover, for an efficient demonstration of technologies, short field day, workshop and group visit was conducted throughout the group for sharing an experience involving neighbor farmers, in addition to frequent follow up of the project at various stages.

2.3 Data Collection and Analysis

Data collection methods:

- ♦ Group and individual discussions.
- ♦ Joint field and home visits.
- ♦ Semi-structured interviews.
- ♦ Continuous interaction (monitoring and evaluation).

Data were analyzed qualitatively from field notes and semi-structured interview guide, organized and summarized after being incorporated into the computer.

3. RESULTS AND DISCUSSION

3.1 Training of Farmers and Extension Workers

Farmer training is one of the important components in the technologies pre-extension demonstration. It is meant to introduce a new way of doing things and/or to fill observed gaps in performance or undertaking some research activities. In the course of demonstration, farmer participants, development agents and experts working for the agricultural and natural resource development offices were participated on theoretical and practical trainings on benefit, utilization and general aspects of managing the technology at different time in FTC.

Total number of farmers participated in technical training of operation of hip pumps were sixty farmers that. More than two hundred (200) farmers have now had exposure to hip pump.

Fig. 1. Photos of fieldwork

Totally eight hip pumps were distributed for all farmers' groups.

3.2 The Benefits of Using the Hip Pump in Farming Practices

Its advantages are saving water; it does not require large water sources, reduce drudgery, saves their time as compared to bucket Irrigation and no need of fuel as it is operated manually by using our hip; It also helps for rearing seedlings at nursery site for those who irrigate a large area of land. It is very useful for those farmers who cannot afford a motor pump and its cost of fuel because the hip pump is affordable for smallholder farmers. In addition to this, it contributed to social and cultural changes, where women operate hip pumps without any traditional or religious constraints considering it as an opportunity for empowerment.

Due to demand created on this technology from neighboring of the hosting farmers and field visits, Sayyo Irrigation Development Authority has been started to provide this hip pump from Addis Ababa although the supply and demand asre not balanced.

3.3 Farmers' Perception and Feedback on the Introduced Technology

In order to improve the technologies, there was a need to elicit the perceptions of the farmers and almost all farmers gave their feedback to modify certain functionalities of the delivered technologies. Furthermore, farmers aired out that the introduced technologies produce positive feature of improving gender role distribution among households in a way that more boys, girls, and men are involved in the irrigation activities by using hip pump.

Although, it has the advantage above the problem with the hip pump are It cannot irrigate on a large area of land, and the other problem is its spare parts because It is imported from abroad. Therefore, the hip pump is recommended for further pre-scaling up and sources of technology should be as close as possible to the farmers.

4. CONCLUSIONS AND RECOMMENDA-TIONS

The study was conducted in west wollega and Qellem Wollega, Oromia, Ethiopia. Totally four farmers' group were established consisting of 60 farmers, 15 farmers in each group. Theoretical and practical training was given for all farmers' group members, Subject Matter Specialists, and Development Agents. Totally eight hip pumps were distributed for all farmers' group.

The respective district Irrigation Development Authority should facilitate for farmers who need these technologies by providing these pumps from the sources. Irrigation Development Authority at Zonal and district level should give training and facilitate supply of the hip pump for farmers and development agents. Non-governmental Organizations (NGOs) who are working in the area of irrigation development should consider this hip pump and facilitate for farmers on credit basis.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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