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A Review of Role of Information Diffusion Methods of Proven Crop Technologies: The Case of Metekel Zone, North-West, Ethiopia

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Abstract: The farming system of Ethiopia, mainly the study location, is still traditional. Based on this, the lives of majority of the population were not improved even it is worsening from time time. For this phenomenon, different factors contributed a lot directly or indirectly; some of them were shortage of infrastructure, poor extension system, low-adoption of agricultural technology, shortage of dissemination of crop technologies to end users, poor management system, lack of capital, low rate of acceptance of full agricultural packages, unusual traditions, religious beliefs, and others. Thus, this particular review paper was designed with the objective to identify, prioritize, and recommend dissemination means or methods of improved crop technologies information for the study area (Metekel Zone). So far, we made critical review on dissemination of improved crop technologies to final users and got the following methods, that is, mass media, television, radio programming, field days, demonstrations, phone, training, religious institutions, newspaper, and journal (article) as crop technologies dissemination methods. However, the information or service to be delivered to end users depends on the accessibility and preference of the dissemination method. Therefore, we evaluated and confirmed that, field days, demonstrations, trainings, and phone service respectively were the most important crop technologies promotion methods for the study area, Metekel Zone, North-West, Ethiopia.

Keywords: Adoption, Crop Technologies, Dissemination, Information

1. Introduction

The history of agriculture records the domestication of plants and animals and the development and dissemination of techniques for raising them productively. Agriculture began independently in different parts of the globe, and included a diverse range of taxa. At least eleven separate regions of the Old and New World were involved as independent centers of origin [26].

Furthermore, the history of agriculture is the story of humankind's development and cultivation of processes for producing food, feed, fiber, fuel, and other goods by the systematic raising of plants and animals. Prior to the development of plant cultivation, human beings were hunters and gatherers. The knowledge and skill of learning to care for the soil and growth of plants advanced the development of human society, allowing clans and tribes to stay in one location generation after generation. Archaeological evidence indicates that such developments occurred 10,000 or more years ago [27].

Human beings, by nature, require at least three basic needs; food, clothing and shelter. Thousand's years ago, man started leading his life by hunting and gathering. However; due to the interest of man, with gradual process, began to select and cultivate phenotypically superior crop species and varieties with the process of domestication.

Currently the population of the world is growing alarmingly. Thus, more agricultural product is expected to be produced

from time to time. However; because of several factors large number of the world population have had shortage of food access, both in amount and quality. Particularly countries under Sub-Saharan region have suffered more.

Factors responsible for the low yield of crop cultivars include biotic factors such as diseases, insect pests, weeds and abiotic constraints like high temperature, heat, edaphic factors (soil problem), salinity, frost, etc.

Ethiopian Institute of Agricultural Research began its task since 1950s'. The institute had national and international responsibility. It comprised several disciplines/directories such as crop research, crop protection research, livestock research, natural resources research, agricultural extension and communication, agricultural economics, technology multiplication and seed research, information communication and technology, finance and procurement, transport and management, human resource process.

Each research directory has its own planned activity with in specified duration. For example, crop research process research task was planned for every three years (for annual crops) and five to seven years for some horticultural commodities (both highland and tropical fruits).

It is obvious that Ethiopian farming practice system is traditional. However; Ethiopian Institute of Agricultural Research with its effort contributed significant role to modify and transform Ethiopian agricultural sector. Considering this in to account; crop research process alone developed (released/registered) more than one thousand crop varieties. Furthermore; different agricultural technologies, information, crop production methods, and other relevant knowledges were generated and documented.

Although, improved agricultural technologies and information generated for the last half century to modify and even to change Ethiopian agricultural sector, but still, we are food insecure. For this, the main factors responsible were lack of infrastructure, shortage of dissemination of crop technologies to end users particularly small-scale farmers, non-adoption of agricultural technology at the farm level, due to farmers' lack of access to the latest information [25], low access to irrigation facility (dependent on rainfall), lack of capital to invest on agriculture, security problem. According to [22] food insecurity is a chronic problem in Africa and is likely to worsen with climate change and population growth. It is largely due to poor yields of the cereal crops caused by factors including stemborer pests, striga weeds and degraded soils. Furthermore; improved varieties of malt barley are released year after year, on-time promotion and distribution of released varieties to smallholder farmers are major research limitations [21]. Similarly, the barriers to farmers' access to agricultural research information included inadequate numbers of extension officers, inadequate funding, inadequate sources of information, nonavailability of electricity, political interference and the absence of information centers [5].

North-West Ethiopia particularly, Metekel zone, is endowed with natural resources such as favorable land for crop production, suitable weather condition, yearly flowing water bodies, presence of young and committed workers, inauguration of modern marketing system (ECX), and others. However, majority of the communities currently practice hand to mouth life style.

Thus, the objective of this review paper is:

1) To identify dissemination means or methods of crop technologies for the study area.
2) To prioritize dissemination means or methods of crop technologies for the study area.

2. Discussion

The different means of dissemination of proven crop technologies were discussed in detail as following:

2.1. Mass Media

Mass media is one of the powerful sources of information which disseminates information about health, education, social, political and agricultural development, etc. [10]. It categorizes into electronic and print media. To a large extent, mass media serves as a veritable instrument for information dissemination in agriculture. Agricultural extension / information delivery is precisely a process of communication of improved skills, practices, innovations, technologies and knowledge to farmers (Google). In terms of information dissemination different stakeholders have different ways to access to mass media; according to [20] study result respondents have different degree of accessibility to radio, television, telephone, Internet, and newspaper/ bulletin. However, according to [8] report newspapers, radio, television, smartphones and the internet are the most important communication devices that provide farmers with knowledge and information about agriculture. Furthermore, CT based information communication had transformed effectively the agricultural sector from traditional way to modern system [1].

2.2. Television (TV)

Advertising on television was one of the most important method of transferring information to customers. However; coverage of television service currently, under Ethiopian condition, was limited to rural areas. This is because according to Ethiopian Electric Power Authority (ELPA) report only 40% of the population had electric power service, the remaining majority population were out of electric power service supply. Thus; promoting and dissemination of improved crop technologies by the use of television service is limited to rural areas of the country but plays important role in areas with electric power accessible places of Ethiopia. However, [16] reported that Farmers mostly use AICCs (Agriculture Information and Communication Centre), non-smart cell phones, TV and radio for agricultural communication.

2.3. Radio Communication

Radio programing was one of agricultural technology dissemination means from the, source, government owned organization or privately managed institution to end users

particularly seed growers (small scale farmers). It is obvious that, source of information for some places in Ethiopia was radio programing. According to [13] radio programming is the preferred source of agricultural and nutrition advice among the rural population. Radio programming has strong positive impact on technology awareness, but a limited impact on actual adoption of most agricultural practices being promoted. However, according to [23] 67.3% farmers told that information related to agriculture provided by the radio programs is helpful to increase the agricultural production and they were satisfied with the information disseminated by radio communication. Moreover, [18] result showed that both awareness and adoption are boosted if SMS supports radio campaigns. However, radio alone is the most cost-effective approach. Similarly, [23] reported farmers told that information related to agriculture provided by the radio programs was helpful to increase the agricultural production and they were satisfied with the information disseminated by radio communication.

2.4. Phone (Regular Telecommunication and Cell Phone)

Currently majority of Ethiopian population had access to telecommunication access; that is both regular telecommunication and cell phone service. According to ethiotelecom report 2021 the number of regular phone service users were 15 million similarly the number of cell phone service users were 22 million. But sometimes network problem needs great consideration. Although it seems to promote crop technologies by phone service, but farmers tendency on accepting and applying these improved agricultural outputs had to be supported by practice (learning by doing). By taking this into consideration, agricultural technologies, particularly crop varieties and information, diffusion means by phone service is limited when compared with other dissemination methods. However, according to [17] mobile phones are combined with other ICT platforms such as mass media, the impact on agriculture is likely to be very high. According to (Khan et al., 2019) the use of information technology like mobile phones are one of the essential communication devices in numerous fields as well as agriculture. Ethio Telecom provided a service 46.15 million mobile voice subscribers in 2019/2020, an increase of 5.8 percent from the previous year. Ethio Telecom is the sole provider of mobile services in Ethiopia.

2.5. Newspaper

Privately owned and Government managed/controlled daily, weekly, monthly, and quarterly published newspapers in Ethiopia plaid great role in transferring palatable information regularly. However, popularization and promotion of improved crop technologies and/or information by newspaper was limited because newspaper was inaccessible to rural communities of Ethiopia.

2.6. Journal Article (Publication)

Since we are under era of globalization, information generation and promotion are undertaken from every corner of the world. Due to this phenomenon; daily lives improved from time to time. Promotion of improved crop technologies by using publications currently is growing greatly. However, publication alone under rural communities of Ethiopia is limited.

2.7. Training

In many aspects of profession training, both theoretical and practical manner, can fill the gap of skill and knowledge. Training, short term and long-term trainings, currently can play significant role in disseminating improved crop technologies purposefully. According to [24] all of the respondents (100%) have got agricultural information in the form of training and extension meeting. Furthermore; the findings of [24] indicated that Woreda agricultural office top rated (77.8%), followed by mass media (55.6%), newspaper (51.9%) and mobile (37%) by delivering agricultural information regularly. Similarly, 96.3% have got from local radio program and 88.9% from field visit, manual and national radio program.

2.8. Field Days

Currently under Ethiopian condition; improved agricultural technologies, particularly crop technologies and information, mostly promoted by field days at regional and national level. During field days event different stakeholders are expected to take part. Farmers mainly, small-scale growers, will have great exposure on how to gather relevant information on the merit of improved crop varieties (cultivars). Except for some limitations; most field days organized so far achieved their missions as per the plan. Through field days, training of farmers should focus on translating the science into a common and easy to understand language so that farmers can easily grasp how the technology works and embrace it as an alternative farming system [7].

2.9. Demonstrations

Recently, at national level, Ethiopian Institute of Agricultural Research designed and followed large scale demonstration of improved crop varieties and information. Based on this system several crop technologies demonstrated and important information documented properly. Thus, demonstrations played significant role in dissemination of improved crop technologies. Similarly, [4] reported adoption of improved cultivation package improves 22..54 to 35.90% yields compared to conventional cultivation practices. In addition, farmer training, demonstration, and farmer-to-farmer interactions were perceived as the most effective agricultural extension methods [2]. In addition, scientific management and monitoring of demonstrations of proven technologies of crop could help in enhancing the income level of the farming community [19].

2.10. Religious Institutions

As we know, majority of Ethiopian population are strong in

their spiritual life. That means they fear and respect their God, their religious leaders, and elder peoples. Due to this they frequently go and worship in different ways, at any time. Because of this it is possible to get large number of people to inform and thereby to promote the relevance of improved crop technologies indirectly. Based on the findings of [5] the use of researchers, religious leaders, and community-based organizations were key dissemination pathways to diffuse agricultural information.

3. Conclusion

This review paper identified, prioritized, and documented the different improved crop technologies and information dissemination methods. Based on this scenario, some of the alternatives were; Mass media, Television, Radio programming, Field days, Demonstrations, Manuals, Leaflets, Religious institutions, Stakeholders' participation. Each information delivering method has its own advantage and drawback (limitation). Thus, the paper suggested and recommend that; the diffusion of improved crop technology and information depends on the accessibility and acceptance of the particular method by end users mainly those directly engaged in agricultural sector. However, field days, demonstrations, trainings, guiding manuals, leaflets, respectively, were the most important crop technologies promotion methods for the study area, Metekel Zone, North-West, Ethiopia.

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