CHANGES IN RESPONSE TO INTEGRATED INTERVENTIONS IN THE VALUE CHAIN OF VEGETABLES IN ATSBI-WOMBERTA DISTRICT OF TIGRAY REGION, NORTHERN ETHIOPIA

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ABSTRACT

With irrigated vegetables development, interventions on the uses of improved inputs such as water lifting devices; varieties; on-farm water, nutrient and pest management, and access to credit and market information were introduced in Atsbi-Womberta district, Ethiopia. Besides, skill and uptake capacity of vegetable growers, extension service providers and vegetable traders were improved accordingly. The response to the integrated interventions in the value-chain of vegetables indicated that the total annual income increased from less than 16,733 in 2000 to more than 3.0 million USD in 2008. Simultaneously, beneficiaries increased by 82% while irrigated vegetable coverage by 87%. These successful changes in income attributed to improved capacity of actors to manage irrigated vegetables effectively in response to emerging opportunities and challenges including shifts in irrigated crop choices in reply to nutrient mining, pest load and market demand. Hence, the introduction of highland pulses in rotation with vegetable ssucessfuly breaks the pest load and increase soil fertility while simultaneously generating high income. Moreover, the presence of attractive market for vegetables and alternative crops triggers the expansion of water harvesting and utilization, increased crop diversification and sharpened the choice of marketable crops to optimize income.

Keywords: Innovative interventions, changes in income, value-chain

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1. INTRODUCTION

With increasing population pressure, there has been continuous cultivation of arable lands, overgrazing and reduction in vegetation cover in Atsbi-Womberta district, northern Ethiopia. These practices result in loss of the fertile topsoil due to erosion. This means finer soil fractions that contain most of the plant nutrients and soil water holding capacity reduced. The loss of the fertile topsoil and reduction in soil moisture retention leads to low yields of less than 500 kg/ha for most crops (Abegaz, 2005). In worst cases, low crop yield is associated with high production risks such as uncertain and erratic rainfall which occasionally lead to crop failure, food shortages and dislocation of rural population. Thus, without extension support and innovative interventions to improve agriculture, the famers in Atsbi-Womberta district have been rendered as food insecure for many years.

Since 1991, a shift in thinking has emerged along with the change in governement in Ethiopia, which focused on 'Agricultural Development Led Industrialization' strategy to support the food security of smallholder farmers. The shift in thinking critically addresses the management of natural resources as a key input for improved agricultural production. The inputs include soil and water conservation on various land uses and some of them have been put under area closure. Consequently, vegetation cover has improved and runoff reduced, groundwater in the valley bottoms has been enriched and springs developed. As a result, crop production under irrigation emerged with a gradual shift from traditional cereals to market oriented high value crops (IPMS, 2004). With the emergence of market oriented irrigated vegetables, the Tigray Region Bureau of Agriculture and Rural Development (BoARD) and its district branch offices, and the Improving Productivity and Marketing Success (IPMS) project facilitated the introduction of participatory market oriented planning and implementation interventions following the assessed gaps in knowledge along the value chain of vegetable production systems. The objective of the paper is to describe the changes and associated approaches and processes for market oriented vegetable commodity development, identify lessons and making recommendations for scaling out/up lessons.

MATERIALS AND METHODS

The vegetable interventions conducted at Atsbi-Womberta district level, located in the eastern zone of Tigray about 70 km north east of the Regional capital, Mekele. The district consists of 23,400 households with an average family size of five (IPMS, 2004). Rainfall occurs between June-September, with an annual average of about 668 mm and air temperature of 18^{o}c with an altitude range of 918 to 3069 m above sea level. Mixed crop-livestock systems are the major practices in the district (IPMS 2004). A multi-stakeholder meeting preceded by a participatory rural appraisal (PRA) identified irrigated vegetable as one of the emerging marketable commodities that could contribute to the livelihood of farmers in the district. The potentials, limitations and gaps in knowledge that warrant interventions were synthesized along the value chain of vegetable production systems. The key gaps in knowledge include lack of access to market linkage and information; lack of skills on product processing and grading, seedling and on farm management, and input handling and operation such as motor pumps. List of interventions were identified with research and development partners, farmers and local administrators under the facilitation of the IPMS/ILRI project (Table 1). Intervention structures and scales follow the structure and scale of the extension service provision. Within the structure, the practical interventions focus more at the scale of farmers and DAs, and specialized capacity development at supervisors and experts. The OoARD and the IPMS monitored the intervention responses at PA level, annually. In some cases, IPMS also facilitated specialized studies to monitor and evaluate the impact of interventions and associated changes in irrigated vegetables using structured household level interviews and group discussion.

Table 1. Integrated value chain interventions on irrigated vegetable development in Atsbi-Womberta district.

Value-chain	Key interventions facilitated by IPMS
Marketing	Linkages among vegetable producers, traders and consumers established and communicate using the telephone services available at each peasant association. Vegetable market information within the district and from the nearby towns has been available to growers biweekly in addition to the weekly supply of market information by radio.
Product	Techniques of quality based grading, packing, transporting and improved temporary

processing	storage options introduced.
Production technologies	Improved skills and knowledge on vegetable seedling, on-farm water, nutrient and pest management practices introduced and demonstrated. Choices of dynamic market oriented cropping patterns in response to nutrient mining, pest resurgence and frost facilitated.
Input and credit supply	Private vegetable seedlings production and marketing, skills on maintenance and operation of water lifting devices such as drip, treadle and motor pumps facilitated. Credit for purchase of vegetable inputs such as water lifting devices was available from credit facilitators.

2. RESULTS AND DISCUSSION

The changes observed in response to the interventions in irrigated vegetables can be classified into four: changes directly associated with the value chain of irrigated vegetables, capacity to response to emerging opportunities and challenges, triggering the expansion of other commodities and altitude towards natural resources management.

3.1 Changes in the value chain of vegetables. Before the intervention in market linkage and access to market information, vegetable price in the main town Mekele was about 2-3 times higher than the farm gate price. After the intervention, the difference in vegetable price narrowed to 40-60% during peak production periods (TAMPA, 2008; OoARD, 2008). After the intervention, vegetables handling, productivity improved. Most of maintenance and repairing of water lifting devices managed within the district as compared transporting to other towns.

The annual income from vegetables increased from less than 16,733 in 2000 to more than 3.0 million US dollar in 2008. Simultaneously, number of beneficiary households increased from 1250 to about 11,400 households while irrigated areas expanded from 109 to1487 ha in the district (OoARD, 2008). Wealth status of households were ranked as rich, medium and poor, on the basis of their herd status, land size and amount of grain (Abegaz, 2005). Aggregately, about 81% of the beneficiary households were classified as medium to rich in wealth status which is food secure households compared to 39.5% from the none beneficiary households (Gebremichael, 2009). About 61% of the non-participating household was classified as poor compared to 19% in the beneficiary households (Gebremichael, 2009).

3.2 Changes in the capacity to respond to emerging nutrient mining, pest status and frost challenges

With continuous cultivation of vegetables, excessive nutrient mining, pest resurgence and frost have emerged as challenges to vegetable production. Farmers test the use of chemical spray, cereal and pulse in rotations with vegetables. Vegetable growers spray different chemicals against various vegetable pests but the economic advantage of spray was not properly evaluated and the problem of nutrient mining and partly that of pests continued as a challenge. Moreover, the use of the chemicals spray showed a noticeable side effect to the mushrooming beekeeping industry.

Farmers indicated that the introduction of cereals in rotation with vegetables, to have reduced pest loads in their plots but nutrient mining continued, and the income obtained from cereals was much lower than that of vegetables. Farmers also indicated that the use of pulses (field pea, faba bean, lentil and fenugreek), in rotation with vegetables, to have reduced pest load, increased soil nutrient levels and incur reasonable income. Most importantly, irrigated pulses were produced during the dry season when there are no other rainfed pulses which fetch about 65-85 USD/qt compared to 45-65 USD/qt for rainfed beans harvested in December. Furthermore, the harvesting of irrigated beans coincides with the peak demand by migrating laborer working in sesame production in the western part of Ethiopia.

Garlic was introduced as an alternative crop during frost seasons. Thereafter, four improved garlic varieties were tested and the improved variety, Tseday 92, gave about 8100 kg/ha fresh bulb yield compared to 4000 kg/ha from the local garlic variety (Teweldebrhan, 2009). Moreover, techniques of garlic bulb seed production and storage demonstrated to farmers. At present, about 25 farmers are producing garlic during frost periods and few started supply of garlic bulb seeds to others. The current price of fresh garlic bulb in the local market is about one USD per kg.

3.3 Triggering the performance of other commodities within the system. Pulses planted during the dry season (January-May) and flower in March and April, when shortage of bee forage is critical. Beekeepers indicated that honey yield and bee colony strength improved

following the introduction of irrigated pulses during the dry season. At the same time, various researchers indicated that grain yield of pulses such as faba bean increase by 19-52% due to honeybee pollination in Australia and Middle East (Musallam et al., 2004; Somerville, 2002). Local and cross breed dairy cows also benefiting from the expansion of irrigated vegetables due to the year round supply of green feed. At present there are more than 500 cross breed cows in the district.

3.4 Changes in attitude towards natural resources management. After the start of irrigated vegetable production, farmers put organized and household level efforts to reduce runoff in steep slopes, constructed detention ponds around farm lands and stabilized gullies (personal communication with farmers). The efforts of reducing runoff showed a substantial change in groundwater enrichment, spring development and increased river flows. For instance in Gergera watershed, about 1.1 million m^3 enriched groundwater was found over the natural water reserve and used vegetable production (Berhane, 2008).

4. CONCLUSIONS

Undoubtedly targeting marketable commodities and interventions designed on the basis of knowledge gap analysis along the commodity value chain have made a significant contribution to the livelihood of rural farmers. The responses reflect in the changes in income and wealth status of vegetable growers, increased number of beneficiaries, improved farm gate price of vegetable, and attitude of farmers to invest in agriculture. The responses also reflect in the capacity of the actors to manage vegetable production effectively in response to emerging opportunities and challenges. Among them include the shift in irrigated crop choices in response to nutrient mining, pest load, market demand and use of frost periods to grow other vegetables. The introduced and tested garlic varieties become alternative crops to generate high income during the frost months. Besides, the presence of attractive market for vegetables and alternative crops triggers the expansion of water harvesting and utilization, increased crop diversification and sharpened choices of marketable crops to optimize income. Thus, the lessons learned on the approaches and processes in the effective introduction and implementation of innovative interventions in the value-chain of vegetables can be scaled up/out to the nearby districts and beyond. To this end, the IPMS and partners, mainly the Tigray regional BoARD conducted

subsequent field tours, exhibitions and workshops to scale up the lessons learned with integrated interventions and responses along the value chain of vegetable production systems.

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