

Practical innovations introduced by the Youth and Employment Promotion Project-GIZ to increase vegetable production in Timor – Leste

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Introduction

This paper describes a project on improving vegetable production for Youth-Producers' Groups (YPGs) in Timor-Leste from 2009 to 2012. The Youth and Employment Promotion Project (YEPP) was implemented by the Germany Agency for International Cooperation (or Deutsche Gesellschaft for Internationale Zusammenarbeit - GIZ). In particular, technical innovations introduced are discussed, and recommendations are made from the lessons learned.

By 2012, the project supported and formed 121 YPGs with 1,195 members. These members comprised of 367 (32%) women and 828 (68%) men and among the members, 269 (23%) had graduated from the Agriculture School. The average group size ranged from 4 to 15 members. In each group, at least 2 members had graduated from Agriculture School.

By June 2013, only 80 groups (66%) were considered successful and viable groups. The high rate of inactive YPGs was due to lack of supervision (a limited number of supervisors?) in 121 YPGs, which scattered across 12 districts in Timor-Leste. Limited supervision was a consequence of recruiting problems and retaining sufficient field staffs.

Two cooperatives were established, based in Suai and Viqueque, with 17 and 43 members respectively. The main farming activities of the groups were producing vegetables, other food crops (such as corn, rice, cassava and sweet potato), poultry, tree crops (such as coconut and cashew nuts), fish culture, and food processing.

The paper begins with a justification of vegetable production in Timor-Leste to increase employment, followed by a description of the formation of YPGs including the practical innovations introduced. The methods and justification for the use of organic fertiliser and pesticides are described.

Justification of creation employment through increasing vegetable production

Vegetable farming was the dominant activity of the YPGs during the project operation. Seventy-five percent of groups grew vegetables as a main crop, or intercropped with other crops. The purpose of growing vegetables was either for sale or for their own consumption. Growing vegetables is popular because there is a market demand for vegetables. It is recognized that vegetables offer an important source of nutrition. Fresh vegetable sales, and their origin, across Dili markets are shown in Table 1 and 2.

Table 1 – Estimate of annual sales of fresh vegetable in Dili markets (quantity and value) in 2013

Market	Kg	(\$)
Becora	258,153	244,493
Comoro	1,055,432	1,443,392
Hali-laran	3,586,990	4,280,086
Taibessi	517,655	504,121
Tasi-ibun (Lecidere)	715,796	1,353,790
Total:	6,134,018	7,825,884

Source: DAI-USAID 2013

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Total estimated vegetables sold in Dili markets were 6,134 tons, valued at US \$7.8 million in 2013 (Table 1). Market Hali-laran sold the highest quantity of vegetables to consumers in Dili, which accounted for 55 % of the total by value. On the other hand, the lowest quantity of sales was Becora market, which accounted for 3 % by value. Comoro market ranked in second position (18%), followed by Tasi-ibun (17%) and Taibesi (6%) markets. Vegetables sold at these markets were from various districts in Timor-Leste (Table 2).

Table 2 – District of origin of fresh vegetables in Dili markets

District	Percentage (%)
Ainaro	17
Baucau	15
Dili	14
Aileu	12
Bobonaro	8
Liquica	6
Lautem	4
Ermera	4
Other	2
Sub-Total:	82
Imports	18
Total:	100

In 2013, districts that supplied significant vegetables to Dili markets were Ainaro, Baucau, Dili and Aileu. The rest of districts supplied less than 8 %. Eighteen percent of fresh vegetables sold at local markets were imported vegetables.

The main reasons for increasing vegetable production are:

1. There is a high demand for fresh vegetable at local markets, which is estimated at 6,000 – 9,000 tons per year
2. Farming vegetable offers job opportunities for youth growers after finishing their schooling
3. Compared to other crops, growing vegetable can generate good income in a relatively short period of time
4. Vegetables are nutritious and can significantly improve people’s food nutrition in rural areas
5. Locally supplied fresh vegetable are estimated only about 48% of the market and the rest (52 %) imported (including vegetables not sold through the local fresh vegetable markets, but imported directly by supermarkets, catering companies or hotels) (Gusmao & Johnston 2013, p 2-5).

Process in the formation of YPGs

A plan was created with young farmers to encourage them to fully participate in farm activities. For the first six months, YPGs were provided with food subsidies (until crops came on stream), as well as technical and management training, start-up investment funds, and ongoing advice and supervision through a team of seven districts coordinators, GFA p. 12-13. The process of the activities was as follows:

1. One day Orientation Seminar for graduated Agriculture Technical Schools
2. Received of the requests and on-site assessment
3. Two-day project concept and organization development workshops
4. Revised proposal from youth groups and contracts were prepared
5. Six-day workshops on starting agribusiness projects
6. Contracts were signed and funds were released
7. Youth groups were monitored and training needs were assessed
8. Managerial and technical training were provided, based on requests
9. Need-based technical and management trainings was conducted
10. Youth groups were provided with additional logistical assistance, based on requests
11. Activities of youth groups were continuously monitored and they were provided with business counseling
12. Formation of the cooperatives for youth groups' project was facilitated.

Innovations in production

Technology development in the agriculture sector in Timor-Leste has contributed directly to a significant shift in supply of various food crops, including vegetable production. Practical technological adoption in vegetable farming systems has encouraged more young people to increase the domestic production of vegetables.

Between 2010-13 GIZ partnerships with MAP (Ministry of Agriculture and Fisheries) has introduced affordable micro-irrigation and others practical innovations to increase vegetable production by youth growers. Detail innovations outlined in the paper include:

1. High value seed
2. Use of potting trays
3. Drip irrigation
4. Mulching
5. Composting
6. Organic pesticides

High value seed

Good seed is a key determinant to produce high quality and quantity vegetables and this is important to fulfill market demand. Good seeds have better germination, growth and development as well as better resistance to drought and diseases that can lead to a better yield and thus higher economic returns to the growers. There was no guarantee that local seeds can fulfill market demand.

Open-pollinated seeds are preferable to hybrid seeds. Both open-pollinated and hybrid seeds were used by vegetable growers during the project life. Although hybrid seeds produced better yield than local open-pollinated seeds, they create growers' dependence on seed producers/suppliers. The use of good open-pollinated seeds was strongly recommended to growers as this type of seed can be saved by growers and/or widely available for growers to plant.

The benefits of good quality seeds are:

- ▶ They are genetically pure (true to type)
- ▶ Offer high return per unit area
- ▶ Less infection with weed seed/other crop seeds
- ▶ They are vigorous, free from pests, diseases and insect problems
- ▶ Respond well to applied fertilizers and nutrients
- ▶ Uniformity in plant population and maturity
- ▶ Easy to handle post-harvest operation
- ▶ Produce high value and marketability products

For example, field experience by youth-producer groups demonstrated that tomato seed imported from Australia (Levante-variety) grew more vigorously, produced higher quality of tomatoes, and yielded 5 kg/plant/season of fresh tomatoes compared to seed from Indonesia (Ratna-variety and Karina-variety). Irrespective of differences, tomato varieties from both Australian and Indonesian grew well, and produce good tomatoes during the rainy season, because they have resistance to wet climatic conditions.

Potting tray

Potting tray is a new method for producing good seedling. This method was introduced to replace the traditionally method of leaf-made container or seedbed method. A tray contains a number of pots for seeding. Normally, a single seed is sown in each pot after the tray has been filled out with the right potting mix which creates an optimum condition for seeds to germinate and thus produce healthy seedlings.

Germination rates of up to 95% are achievable, making the use of high quality, expensive seeds feasible. Seedlings in pots grow and hold soil well and the soil with root is easily removed for transplanting, thus preventing damage to seedling roots. This helps seedlings reduce stress after being transplanted into an open field.

Other advantage of using potting tray is that it is convenient to transport as well as to handle seedlings grown in a potting tray; 128 seedlings can be grown in a tray. This new method is more effective and efficient in that it encourages youth groups to engage more in farming activities compared to other seeding methods.

Drip irrigation

For an effective irrigation system, GIZ field staff introduced a new system of drip irrigation to youth producer groups to irrigate their vegetables.

The new drip irrigation system was introduced in a year at a Professional Agriculture Course at Natabora Agriculture School, and in the YPGs training centers. This system was introduced to replace the old system, which was ditch irrigation system that was considered not effective due to washing top soils and fertilizers away from the growing sites.

The new technique is attractive because it saves water and fertilizer more than 50 % compared to old system. The system also protects topsoil from erosion. The system produces large size of vegetables which are highly demanded by restaurants and markets.

Growers found that new practices provide more labour efficiency. The new techniques are not only attractive and motivated to growers but also benefit environment, given growers a greater chance of success.

The cost of setting up a drip irrigation system is around US\$ 265 per 1,000 square meters. This does not include the cost of water tank of 1000 litre which is about US\$ 130/tank.²

Straw mulching

² Those interested in establishing a small scale drip irrigation for vegetable production in Timor-Lese should contact Mr Peter Dougan at +670, 77609013.

Plastic and straw mulches were used by the groups for growing vegetables. Plastic mulch is expensive and difficult to obtain in Timor-Leste. Straw mulch (rice, corn and bean straws) was preferred by the groups as it is widely available in rural areas. Straw mulch can protect soil from rain, reduce soil evaporation, increase water use efficiency and improve soil fertility after decomposition.

The benefits of mulching include:

- ▶ **Reduced evaporation:** Soil water does not escape from under straw/plastic mulch.
- ▶ **Reduced soil compaction:** Soil under mulch remains loose, friable and well-aerated. Roots have access to adequate oxygen and microbial activity is excellent.
- ▶ **Reduced weed problems:** Black plastic mulch provides good weed control in the row.
- ▶ **Reduced fertilizer leaching:** Water runs off the impervious mulch resulting in maximum utilization of the fertilizer.
- ▶ **Cleaner product:** A mulched crop is cleaner due to elimination of soil splashing on the plants or fruits.
- ▶ **Created a home for beneficial predator:** mulched soil as a home for beneficial beetles and spiders that could reduce the need for pesticides to prevent onion thrips (a pest) in onion field (Herring 2013, p15)

Compost

Composting is a technique used to accelerate the natural decay process and converts organic wastes to a mulch, which is used to fertilize soil. Composting time varies from 14 days to one year, depending on labour and type of microorganism used.

In vegetable farming, compost is well-known as organic fertilizer and importantly this can be produced locally and therefore it can be used to replace a more expensive chemical fertilizer which may have a negative impact on environment and health.

Advantages of using compost are:

- ▶ Improving soil fertility
- ▶ Increasing vegetable production
- ▶ Easy to make from local materials
- ▶ Cheaper than chemical fertilizers.

Although there is no chemical analysis showing the nutritional benefits of the compost, field observations show that compost improves soil fertility and soil structure.

The project used a standard composting technique with the use of a microbial activator to enhance the composting process. The microbial activator was a solution of EM4 (Effective Micro-organisms 4) or Micro Organisms Local (MOL); EM4 can be purchased from agriculture shops, while MOL can be made from coconut water, gin, pineapple, and papaya. Five liters of EM4 or MOL were mixed with 10 liters of water and sprayed onto the composting material twice a week. Within 2-3 weeks the compost was ready to use and had no smell, good micro-organism activity, and was black in colour and soft with all the materials biodegraded; signs of good compost GIZ p15-19.

Organic pesticides

Organic pesticides have no negative impact on the environment and are safe to existing predators. Reasons for introducing organic pesticides are: (i) Chemical pesticides can harm the environment and kill beneficial predators; (ii) Farmers in Timor-Leste do not often have money to purchase chemical pesticides; and (iii) the ingredients are cheap and locally available to make organic pesticides.

Using organic pesticide allows vegetable growers to reduce the use of synthetic pesticides by more than two-thirds and at the same time, produce top-quality of fresh vegetables. Locations where GTZ - RDP

facilitated farmers to use organic pesticides were in the villages of Liaro, Betecania, Caitarahu, Henihuta, Cailletiana, Fatosa, Loho, Uhacai, Halderai, Canlor, Uaisimo, Loiboroua, Soba, Afaloicai Baugia, Venilale, Quelicai.

The project used *Vitex negundo* (commonly known as the five-leaved chaste tree) to make organic pesticide. A 10 kg of the plant material was crushed to make a powder and 1 kg of this powder was added to 10 liters of water and 5 cc of detergent. The mixture was stirred in a bucket, closed with a cloth, to avoid direct sunlight, and stored in a shady place for 24 hours before being used,³ GIZ p15-19.

This solution was only effective to prevent crops from insects and microbes but not effective to kill/eradicate insects and microbes, and for this reason chemical pesticides were used.

Conclusions and recommendations

Market demand for fresh vegetables in Timor-Leste increases from time to time. Whilst domestic production has increased, it is still not sufficient enough to meet market demand and, therefore, imported vegetables are needed to fulfill the demand. However, this provides an opportunity to increase more vegetable production in Timor-Leste.

Vegetable farming creates jobs and incomes for young farmers. Use of new technologies (improved seeds, potting trays, mulching, organic fertilizer and drip irrigation) enhance vegetable production and labor efficiency making vegetable production more attractive to young farmers and increasing the economic benefits. This in turn would reduce importing of vegetables into Timor-Leste.

A study is justified to better describe and quantify those vegetables which can be produced locally and which are now imported. Also important is the seasonal fluctuation of such imports so that shortfalls in domestic supply can be matched against the seasonality of local production opportunities.

Young and educated farmers are more able to recognize the benefits of commercial contract-farming arrangements. Contract farming will be an important mechanism to ensure production for the market at the right time, in the right quantity, and of the right quality. The link between farmers, traders and the wholesale and retail markets are made explicit by such contracts.

There is very little economic data for vegetable production in Timor-Leste, particularly costs and returns, or gross margin data for individual crops. It is important to collect this information so that the returns to land, labour and capital investment can be quantified and compared to other opportunities.

The YEP project has now finished. Groups can gain access of support from the Directorate of Cooperatives if they establish cooperative structures, and the Ministry of agriculture (MAP) can support these groups with technical expertise, and non-technical support such as providing vegetable seeds. It is important for the Directorate of Cooperatives to support the formative capacity and institutional strengthening of these groups to become cooperatives, and to coordinate well with MAP.

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³ Those interested in making compost and pesticides organic for vegetable crops in Timor-Leste should contact Mr Abilio da Costa at +670, 77283674.