1. Introduction

In the interior of Suriname the consumption of vegetables is not common, especially with the Indigenous people living in the South of Suriname. Staple food crops as cassava, banana and some other root crops are mostly grown. Incidentally some vegetables or legumes can be found

The Amazon Conservation Team (ACT) is aware of the many risks that these people face securing for food, especially after the floods in May and the loss of crops due to infestation by fire ants. The control of ants is difficult and requires long-term research. The cultivation of vegetables in and around their homes may be a solution for the Trio people to guarantee their food supply. Therefore ACT organized a short training course where women were taught methods and practices to grow vegetables in the vicinity of their village. The produce can either be used for own consumption or can be sold to other people in the village, and maybe in the future for tourists (e.g. ecotourism).

From 25- 27 September 2006 a group of 25 women from the Trio community in the South of Suriname were trained in Kwamalasamutu in aspects of vegetable production. Four participants were from the villages of Sipaliwini and Alalapadu.

2. Objectives

The main objective of the training was to teach participants to cultivate vegetables in an ecologically friendly manner without the use of chemical inputs.

Specific objectives

1. create awareness on the use and consumption of vegetables and the benefits for human health
2. teach the participants about different types of vegetables
3. teach participants practical skills about:
    a. plant propagation methods: generative and vegetative
    b. seed production, extraction, cleaning, drying and storage of some vegetables
    c. seed bed preparation
    d. tillage and preparation of a small “home garden”
    e. design of a bed, bed systems and cropping systems (intercropping)
    f. sowing methods: broadcast vs. sowing in rows, sowing depth
    g. transplanting methods: from seedbed to cups, from cups to bed, plant depth
    h. the importance of planting distance
    i. fertilizer use
    j. compost preparation and the use of compost
    k. biological methods of pest control
    l. the importance and the use of organic mulch in vegetable production

3. Participants

A group of 25 women in total participated in the training. Most of the women were from Kwamalasamutu, 2 from Alalapadu and 2 from Sipaliwini. Some of the women of Kwamalasamutu are members of the women’s foundation NANA. (See Annex 1)

4. Methodology

The training was a combination of both theory and practice. Through PowerPoint presentations the women were taught the basics, while in the greenhouse practices were demonstrated after which the participants had to carry out the exercises themselves (Fig 1).

Fig. 1. Joan Muller explaining the trainees about soil fertility and site selection

The language used by the trainers was Dutch and Sranang Tongo, while two participants assisted us with translation into the Trio language. The vegetables which were used in the training were selected together with the coordinator of the course Ms. R. Bong A Jan (see Annex 2). Tools and other materials were supplied by ACT.

5. Overview of the course

In close cooperation with the coordinator of the training a schedule was set up for the training. The first session which was scheduled for Monday evening 25 Sept was canceled. Many of the women were not informed yet, because the megaphone of the *granman* did not work, and the generator was out of order. Ms. Bong A Jan was able to contact most of the participants by visiting them at home till late in the evening. On Tuesday 26 September every one was present.

Day 1 – Monday 25 September 2006

Arrival at the airport 8.30 h am
Departure from Zorg en Hoop: approx 9.15 h am
Arrival at Kwamalasamutu: 11.15 h. am
Between 12.00 and 16.00 h we had lunch, and inspection of the site where the women could do their practical.
The location of the greenhouse was ideal due to its proximity near the lodge.

Fig 2. Meeting ACT staff with the granman of Kwamalasamutu

At 16.00 h ACT staff and trainers met with the *granman* of the Trio's (Fig 2), where an overview was given on activities of ACT and purpose of the training. The trainers were introduced. The *granman* was asked to contact the participants to attend the training. After the meeting the trainers were given a tour in the village.

Day 2 – Tuesday 26 September 2006

Morning session 9.00 h am – 1200 am Practical

Introduction

The morning session started at 09.00h with a short introduction on the importance of consumption of vegetables. The participants were tested on their previous knowledge of vegetables:

1. Do you know any vegetables?
2. If yes, which vegetables do you know or have you ever eaten?
3. Have you ever grown any vegetables?

A few participants knew "*tayerblad*" (leaf taro) and "*bitawiwiri*" (bitterleaf), and some whom have visited Paramaribo knew "*kouseband*" (long yard bean).
Most of the vegetable types we had brought (tomato, African eggplant, eggplant, pepper, *kaisoi*, bitter leaf and kangkong) were not well known. A short explanation on the use and cultivation of these vegetables was given.

Fig 3. Overview of the greenhouse

The location where the practical sessions were given is a shaded greenhouse (Fig 3). Half of the greenhouse was shadier than the other. The location was not cleaned and was overgrown with weeds (Fig 4). The participants were immediately put to work to remove weed, organize the greenhouse and water the medium in the seedbed because it was very dry. The soil was enriched with fresh humus which we

had bought in Paramaribo. Several tools were used to order the place. Within half an hour the women had the place cleaned and we could start.

Bed system, lay-out and bed size

The greenhouse was constructed in such a way that two scenarios could be simulated, the shady side for planting leafy vegetables in a container or raised bed constructed from wood and the "sunnier side" (Fig 4) where the field situation was demonstrated (small home garden).

We decided to plant the shallow rooted leafy vegetables in the raised bed (Figs 5 and 7), and the deeper rooting vegetables in the "home garden".

The bed size was kept narrow (1-2 m) (Fig 8) and inter row cropping was used as cropping system.

Fig 4. Sunny part of the greenhouse before and after removal of weed

Soil cultivation, tillage and bed preparation

We showed the women how to choose a site. First we explained to them the color of the soil as an indicator of soil fertility; secondly soil aeration and compaction were discussed. Their beds should be made on sites where existing vegetation is either grass or shrubs and not bare soil as in their village.

Fig. 5. Raised bed on the shady side of the greenhouse

The medium of the raised bed was dry. Clods, stones and other large material were removed and the bed was raked and enriched with fresh organic matter (humus).
For the *home garden* heavier tools were used such as a standard garden fork, hoes and even machetes, because the soil (sandy soil) was compact. Many of the participants showed good skills in soil cultivation aspects.

Propagation and transplanting
The first practical was a short introduction on propagation. Seed from *kaisoi* was shown to the participants. The principles of broadcast sowing and drill sowing (direct sowing) were demonstrated. The effect was sowing depth was explained.

Fig 6. Trainers explaining transplanting techniques to the trainees

Three-week old kaisoi seedlings which were grown in plastic cups were transplanted in the raised bed. The technique of transplanting from a cup or cell to a bed was demonstrated (Fig 6), after which the participants had to show their skills by transplanting some seedlings in the bed. We showed the difference between transplanting pepper seedlings which were planted in plastic bags, and the other seedlings grown in cups.
Planting depths vary according to container size and this was also emphasized during the practicals.
We had also brought along a container with one week seedlings sown broadcast which had to be transplanted into a cup. All participants had to fill cups, and transplant at least one plant.
Vegetative methods of propagation which we showed were the use of cuttings and division. *Kangkong* toppings, (which we had rooted two days before in water) leafy onions (‘prei’ of ‘bosuitjes’, lente uitjes’= Dutch), were used as plant material and leaf taro (tayerblad) plants were divided and planted in the raised bed (Fig 7).

Fig 7. Aminah Carilho showing the leafy vegetables planted in the raised bed

In the ‘home garden’ (Fig 8) the larger sturdy seedlings of tomato, hot pepper, African eggplant (‘antruwa’) and eggplant (‘boulanger’) were transplanted in rows.

Fig 8. Small ‘home garden’ with several vegetables planted on a narrow bed in rows

Plant spacing

An important aspect of bed layout and design is the type of vegetables you want to grow, the cropping system and last but not least the plant spacing. The importance of plant distance was explained and the importance shown by making the participants stand in a row and pretending to be plants growing. For each vegetable type we showed the proper distance in a simple way. *Kaisoi* and taro are planted closer while tomato and pepper or kangkong need more space to grow in order to become healthy plants and produce good yields.

Watering plants
The beds with plants were watered with water from the creek by using a plastic watering can. The women were shown how to check if the soil was watered properly by digging a hole next to the plants and checking the moisture content of the soil in the deeper soil layer. The morning session ended at 12.00 h am

Afternoon session 17.00 – 1900 h pm
We had prepared several PowerPoint presentations for the trainees (Fig 9). The first part was presented by Aminah Carilho and included:

1. The importance of vegetables for human health
2. A review of different types of vegetables

Fig 9. Participants during the afternoon session in the lodging of ACT

The second part was presented by Joan Muller and reviewed the following topics:

1. Propagation of vegetables
2. Design of a small garden, cropping systems, planting distance
3. Taking care of a small garden

During the last part the trainees were given information on fertilization (use of natural fertilizers) and preparation of compost, mulching, biological methods of pest control by Aminah Carilho. The session ended at 19.30 h pm.

Day 3 Wednesday 27 september 2006

Morning session 9.00 h – 12.00 h am
On Wednesday the morning session consisted of practicals. First we started by making them identify and name the vegetables planted by them. They all remembered the names. After that time was spent on seed production, extraction and cleaning. Seed extraction of pepper, tomato, and peas (*capucijner* = Sur) was demonstrated. The difference between tomato and pepper seed was shown and the methods of extraction (dry seeds as peas, beans and wet fleshy fruits as tomato). Tomato seed with pulp needs a fermenting phase to remove the aril around the seed while pepper just needs some washing. Drying methods in the sun was explained and the danger of using aluminum roof plates was also discussed. Storage in a cool place in a closed container can keep some seeds viable for some months.

The second part was spent on garden care. Fertilization, mulching, and pest control were briefly discussed and demonstrated.
The difference between chemical fertilizer (NPK) en compost/humus was shown. The participants were also told about the costs and dependency of use of chemical fertilizer. We encouraged the trainees to use organic fertilizer e.g. compost. The plants were then fertilized with compost (circle around the plant) (Fig 10).

Fig. 10. Participants practicing fertilization methods with compost spread in a circle around the plants

Aminah explained very briefly the making of a compost heap. In the greenhouse an existing compost pile consisting of cassava shells and sand was present, but the quality was inferior, because the pile was never turned and looked after.

Fig. 11. Mulch from the compost heap was spread around the plants in the bed

It was however very well suited for use as mulch (Fig 11). Mulch was applied by the trainees and the advantages of mulch were discussed (moisture retention, reduction of soil temperature, weed suppression and increasing soil fertility).
Pest control
The following biological control measures were explained and demonstrated:
- Neem as an insecticide; and preparation for use in control of several insect pests
- Use of hot pepper ('*alatakakapepre*'= Sur.) mashed together with garlic cloves and

dissolved in water left overnight for ants
- Use of soap for some leaf eating and sucking insects (light concentration)
- The use of leaves in treatment of the plants
- Planting marigold *(Tagetes patula)* plants in and round your vegetable garden, and the effect it has on keeping insects away.

The session ended around 11.30 h a.m. At 12.00 the training was concluded with a lunch and a group picture (Fig 12). The trainers as well as the trainees exchanged their gratitude and especially the women from Alalapadu and Sipaliwini were shown that the knowledge and skills learned from the training had to be spread further in their village. Participants were given some plant material and seeds to plant in their own vicinity.
At one o'clock we departed from Kwamalasamutu and arrived at Zorg en Hoop at 3.00h pm.

6. Conclusion

Most of the participants were not familiar with many of the vegetables discussed and planted there. However they did show interest in growing some of the vegetables. Pepper seemed to be in great demand.
The Trio women are not very keen on answering questions, but liked it better when you demonstrate and make them work. The practical sessions were very successful, and the women showed good skills in bed cultivation, transplanting, fertilization with compost and mulching after a demonstration. For future courses we think the methods used in this training were useful: *practice before theory*. ACT could provide the women with handouts (using cartoons) when crop management practices will be taught to them (fertilization, transplanting, mulching, etc.)
PowerPoint presentations were helpful but must include more pictures.
For the practical sessions more demonstration material is needed to make them understand certain topics faster (e.g. when do you harvest eggplant for seed production: fruits of different ages).
The ACT staff should follow these trainees, and evaluate on the adoption and use of vegetables for consumption.

Fig 12. Participants together with trainers after completion of the training

Annex 1

Participants in the training in vegetable production in Kwamalasamutu

Nr.	Voornaam	Achternaam	Leeftijd
1	Kerina	Kanapunu	15
2	Shinaishi	Wahki	18
3	Ketrin	Jami	16
4	Lupita	Oekimuung	19
5	Matatia	Jami	18
6	Lisjas	Reshoede	18
7	Koria	Oochpatapo	20
8	Lida	Koepoeroe	23
9	Efrata	Oochpatapo	35
10	Senpanijasë	Panotanin* (S)	21
11	Rusia	Reshoede	19
12	Klarisë	Shieke	20
13	Fransi	Nonawaike	20
14	Kessia	Koeiki	36
15	Seini	Jami	23
16	Joanna	Shikoei	34
17	Samediana	Toeroenmang	38
18	Ester	Toeroenmang	34
19	Rumanta	Jïtashe * (A)	39
20	Rijonisije	Ijapawai * (A)	26
21	Kukani	Pantorina * (S)	28
22	Jolante	Inkapidoe	31
23	Reoni	Inkapidoe	16
24	Eppi	Inkapidoe	46
25	Eskita	Moese	16

Seini Jami en Lisjas Reshoede assisted with translation from Dutch into Trio

*S = Sipaliwini participants
*A = Alalapadu participants

Annex 2.

List of vegetables/ plant material used in the training

Vegetables

1. Kaisoi – chinese cabbage
2. Dagublat – kangkong
3. Prei – leaf onions
4. Tomaat – tomato
5. Antruwa – african eggplant
6. Boulanger – Eggplant
7. Tayerblad – Leaf taro
8. Capucijner - Vigna (peas)
9. Peper – hot pepper

Other plantmaterial

1. Afrikaantjes – Marigold (flowers and seed)
2. Neem twigs – Neem
3. Alatakakapepre – Hot pepper