



Conservation Agriculture with Drip Irrigation in Siem Reap, Cambodia



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Introduction

Vegetable production is a women's domain in Siem Reap, Cambodia. Women decide what and when to plant, what maintenance activities to do and when to harvest and how much to market and retain for family consumption.



Vegetables conservation agriculture - Chinese Kale with rice mulch

Vegetables in Siem Reap comes from neighboring countries such as Vietnam and Thailand. Increasing Siem Reap farmers capacity to produce vegetables will make them compete successfully in the local market. By using conservation agriculture -- minimum soil disturbance, continuous mulch and diverse species -- which minimizes soil evaporation, reduces soil temperature, arrests soil erosion, and increases soil fertility from legume mulch farmers will conserve their soil resource and make their farming more productive and sustainable.

The addition of low cost drip irrigation will make Siem Reap women farmers produce well during the dry season (November to April). Even during the rainy season, irrigation is sometimes needed due to having sandy soils that dries up quickly in between rainfall occurrences.



A. Vegetables conservation agriculture with drip irrigation - Cucumber with rice mulch and drip irrigation covered with rice mulch. B. Cumber in tilled system with drip-irrigation

CA with drip will lessen labor burden of women farmers in intensive vegetable production. When fully established, the cover crops or mulch in CA will prevent weed growth and lessen evaporation thus needing less water than exposed soils. Drip irrigation will make farmers control water given to plants minimizing water loss, diseases, and weeds. Also, sensitive crops such as cucumbers will not be prone to being hit by the sprinklers avoiding them from being aborted.



Siem Reap Women farmers Kon and Ree watering conservation agriculture plot and gathering water for irrigation, respectively.

Materials and Methods

Identification of women farmer partners in 3 villages



Successful women team Women help women team Peaceful women team

Conservation agriculture with drip seminar and workshop



A. Siem Reap Women farmers identifying cropping cycles during the workshop on conservation agriculture with drip irrigation. B. Siem Reap women participants after drip irrigation installation demonstration and practice.

Delivery of 500 Liter Water Tanks for Drip Irrigation



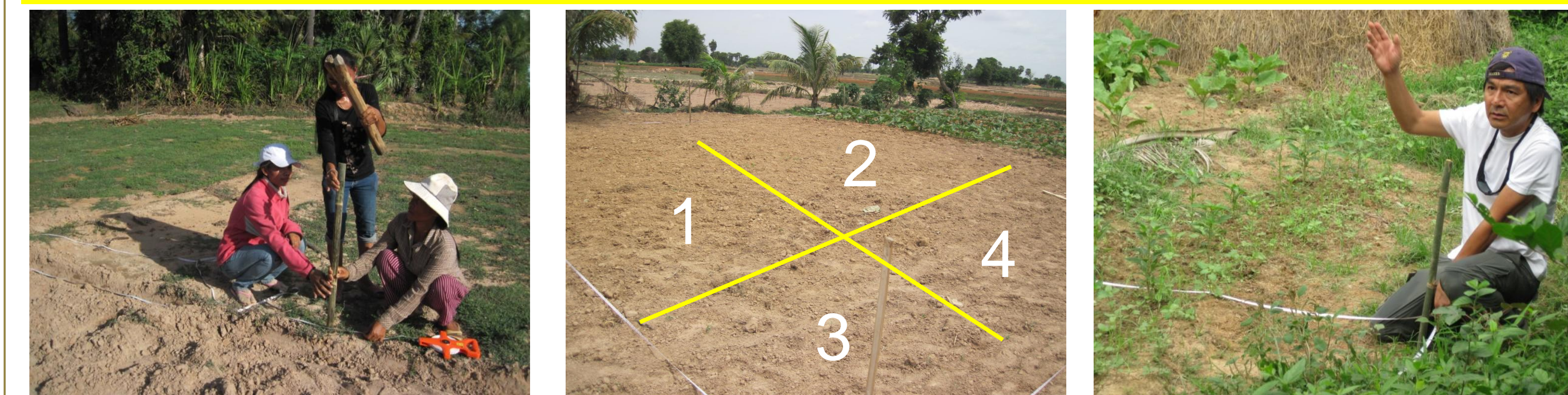
Delivery of 500 Liter irrigation tanks to 15 women farmers by use of 1. cow 2. truck and 3. tuktuk (motorcycle taxi) in Siem Reap, Cambodia.

Installation of low cost drip irrigation



Women farmers learn how to install low cost drip irrigation materials in their farms in Siem Reap, Cambodia.

CA and drip irrigation experiment field lay-outting



Field lay outting of women farmer's farms in Siem Reap, Cambodia. Each farm is a block and are divided into four and treatments T - tilled, TD - Tilled with drip, CA- Conservation Agriculture and CAD Conservation agriculture with drip were assigned randomly. There are five farms in each village.

Planting and harvesting



Upper left to right: Planting cucumbers, cucumbers with mulch, Chinese collards with drip irrigation and rice mulch. Lower left to right: Cucumbers weighed for market, farmer Seab harvesting cucumbers, farmer Seth weighing her Chinese collards.

Results

Mean number and mean yield of cucumber

Treatment	Mean Number of marketable fruits (No./ ha) n = 5	Mean Yield of Marketable fruits (t/ha) n = 5	Mean Number of Non-Marketable fruits (No./ ha) n = 5	Mean Yield of Non-Marketable Fruits (t/ha) n = 5
-----Women help women team-----				
Conservation Agriculture	131,111	14.0	48,889	2.73
Conservation Agriculture with Drip	140,000	13.4	37,778	3.14
Tilled	158,889	14.8	46,667	2.83
Tilled with Drip	160,000	16.0	37,778	2.68
-----Peaceful team-----				
Conservation Agriculture	148,889 ^b	13.1 ^b	18,611 ^{ab}	1.26
Conservation Agriculture with Drip	185,556 ^{ab}	15.5 ^{ab}	18,333 ^{ab}	1.20
Tilled	170,000 ^b	14.9 ^{ab}	15,556 ^b	1.15
Tilled with Drip	222,222 ^a	19.7 ^a	19,444 ^a	1.53

* Means having the same letters under the column and farmer group are not significantly different at 5% level of significance as indicated by Fisher's protected LSD test.

Yield of Chinese kale from Successful women are not presented since they are still currently being harvested

Discussion

In women help women team, all treatments have an average marketable cucumber yield of 14.5 t/ha with 2.8 t/ha non-marketable yield. In peaceful women team cucumbers under T, TD and T have an average marketable yield of 16.7 t/ha. The CA, CAD and T have an average yield of 14.5 t/ha. TD gave more yield than CA of about 2.2 t/ha. Non-marketable yield of peaceful women have an average yield 1.3 t/ha.

Differences between CA and T and CAD and TD are expected to be different in favor of T and TD because of mineralization of organic matter during the first years. However, in this case they are not significantly different thus it implies that CA and CAD could give farmers about the same amount of yield while practicing conservation agriculture. The drip irrigation did not show an effect during the first cropping season possibly due to the rainy months from May to September. Drip irrigation will likely increase farmers yield during the dry season.

Conclusion

The application of mulch in conservation agriculture did not significantly affect the yield of cucumbers in Siem Reap, Cambodia. Thus farmers can do conservation agriculture without significantly affecting their yield. On the other hand, drip irrigation did not give an effect possibly due to the rainy season on which the cucumbers were grown.

Future studies

The experiment will be extended to 5 more growing seasons to better see advantages of conservation agriculture with drip irrigation. Also, labor requirements in irrigation and conservation agriculture will be recorded to see labor differences among treatments.

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