

Productivity and Growth in Organic Value Chains (ProGrOV)

MULCH FOR PEST CONTROL: A WAY TO GO IN ORGANIC AGRICULTURE

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Introduction

Weeds are among pests which have led to environmental degradation due to its control in agriculture. In organic agriculture, weeds are reported to cause a loss of up to 95USD billion per year in Africa only. Tomato and sweet pepper like other vegetables face many constrains, both biotic and abiotic.

The biotic stresses are weeds, diseases and insect pests. In tropical cropping systems the presence of weeds is very pronounced because of large soil weed seed- banks, and favourable environment for their growth and development.

Among pests, weeds appear to have the most negative effects. 53-67% yield reduction in tomato can be due to weeds, while, insects can have a reduction of 30-50%.



Oxalis spp

In conventional farming weeds can be controlled by using herbicides, however, this is prohibited in organic production and therefore mulches offer the best alternative. Different types of mulches can have 27-97% efficiency in weed control depending on the type of weeds to be controlled. Therefore, the type of mulching materials and its availability is an important factor in attaining weed control. The choice of mulching materials will depend on the local availability of these materials for mulching.

In this study, field experiments were conducted in two villages Nyasa and Forest at Lushoto, Tanzania to identify a suitable pests control strategy under organic agriculture system. Effects of seven weed management practices (sub plots) using different mulchs materials were evaluate on pest incidence and yields.



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Study Approach

Step 1: Lushoto and Ubiri villages Organic farmers from Usambara LISHE trust group were identified by the guidance of Tanzania Organic Agriculture Movement (TOAM).

Step 2: Randomized Completely Block Design (RCBD) was used, treatment allocated by Split plot method, with crop type as main factor and types of mulch as sub-factor. Treatments were dead mulch (Tithonia and Mexican weeping pine at 10cm and 15cm), solarization (plots cultivated and irrigated, then covered by 0.08mm plastic sheets for 4 weeks then removed and temperature recorded), weeding (4th and 8th week) and control (no weeding).

Step 3: Weeds in 1m² quadrant were counted at 2nd and 4th week, identified and biomass were determined. Insect data were recorded twice at vegetative and twice at flowering. Marketable and unmarketable fruit yields were measured at harvest.

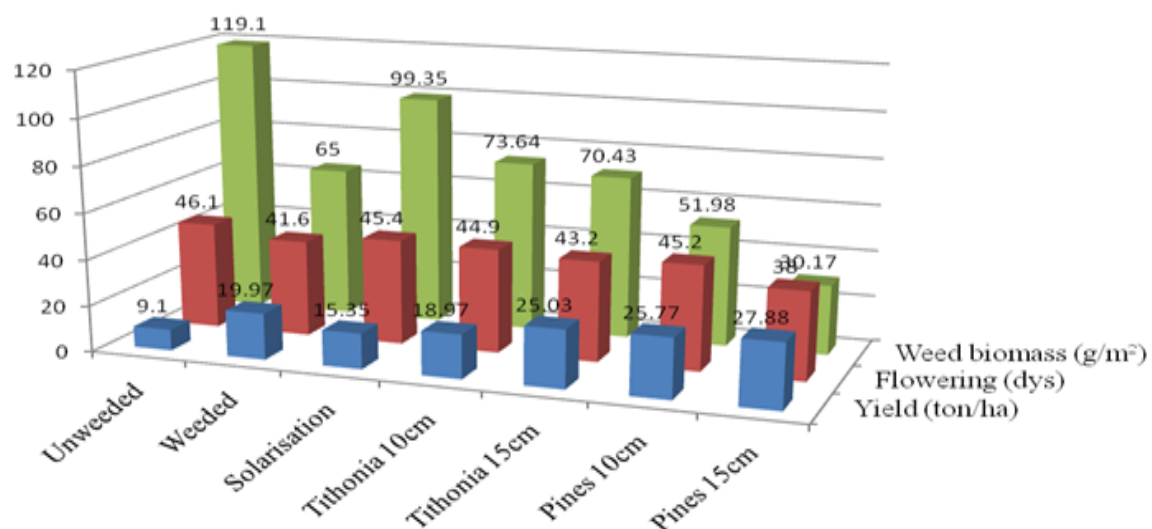


Figure 1: Sweet Pepper attributes at Ubiri in off season

Results

Yields and Yield Attributes:

All two levels of pine mulchs 15 and 10cm in tomato produced the highest yield respectively, followed by plots with tithonia, weeding, solarization and lastly control.

Weed Pests:

Weed counts were lowest when crops were mulched compared to bare plots. The most dominant weeds were broad leaf and sedges. The most frequently observed weed species were Oxalis spp, Amaranthus spp (pigweed), Commellina spp and Cyperus spp (water sedge).

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Beneficial Insects:

Mulch treatments had relatively lower insect pests but higher beneficial insects. Insect pests observed were, Aphids, Cut worms and Thrips, while beneficial insects observed were, Ladybird beetles, Bees, Butterflies and Spiders.

Fruits Marketability:

Marketability was higher for tomato and sweet peer covered with mulchs, this is due to good appearance associated with high quality hence appealing to customers. Fruits covered with pines are highly marketable followed by those covered with tithonia.

Trt	Ladybird beetles (number/m ²)				Spiders (number/m ²)			
	Sweet pepper		Tomato		Sweet pepper		Tomato	
	Ubiri	Lusho	Ubiri	Lushoto	Ubiri	Lushoto	Ubiri	Lushot
Pines (15cm)	9.9	11.5	10.3	13.9	6.8	5.0	5.7	7.4
Pines (10cm)	8.5	10.7	10.3	12.3	6.0	4.2	5.0	5.9
Tithonia 15	8.0	9.6	8.0	10.6	6.0	3.8	3.5	4.5
Tithonia 10	5.1	7.9	6.1	10.0	4.4	2.0	2.3	3.1
Solarization	3.2	4.5	3.7	6.1	2.8	0.3	2.7	1.5
Weeded	4.7	5.0	3.2	4.1	2.6	3.9	1.0	2.9
Unweeded	5.0	6.1	4.8	5.7	4.0	4.6	4.9	5.1
Mean	6.3	7.9	6.6	9	4.7	3.4	3.6	4.3
S±	0.1	0.9	0.7	0.1	0.4	0.2	0.6	0.3
CV(%)	11.7	31.2	23.6	21.4	18.3	21.6	27.1	24.6

Table 1: Beneficial insects' scores

Cost benefit Analysis:

- Comparison in yields of the different management practices used for growing the two crops and the current standard farmer's practice revealed the potential of the pine mulches in increasing fruit yields
- Weeding frequency was lower and spraying was not necessary in these plots while fruit yields were higher compared to weeding practice currently used by farmers.
- Mulching especially pine mulches was the cheapest weeds management practice. This is due to the fact that, the materials are available surrounding the farmer's fields throughout the year

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Conclusion

Mulch was effective in reducing the number of weeds and insect pests in organic farming than other treatments including the farmer's standard practice (weeding).

Mulch also attracted more beneficial insects which are natural enemies of the insect pests contributing to high fruit yields.

Recommendations

Mulching can be used in organic agriculture for both weeds and insect pests. To maximize yields and avoid significant losses, mulch should be in appropriate depth and should be supplemented by weeding if necessary.



Tomato plot under pines mulch- 15 cm thick



Tomato plot under Tithonia mulch - 10 cm thick

Partners

Makerere University, Uganda
University of Nairobi, Kenya
Sokoine University of Agriculture, Tanzania
Aarhus University, Denmark
University of Copenhagen, Denmark
International Centre for Research in Organic Food Systems (ICROFS), Denmark

Associated partners

National Organic Movement of Uganda (NOGAMU)
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Further reading:

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For more information visit:

<http://icrofs.dk/en/research/international-research/progrov/>

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