



# Growth response of Ethiopian kale (*Brassica carinata*) and spider plant (*Gynandropsis gynandra* (L.) Briq.) to mulching

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## Introduction

In the light of climate change water shortage will limit crop production. For instance, with the rise in consumption of African indigenous vegetables (AIVs) in urban and peri-urban areas of Kenya, shortage of water between rainy seasons by producers who rely on rainfall [1] has been noted. Mitigation measures including growing crops that are adapted to low moisture such as AIVs and use of water saving technologies such as mulching are necessary. Mulching reduces unproductive evaporation leading to reduced water loss and result in increased yields and quality of vegetables under limited moisture environment.

**Objective:** To investigate the growth response of Ethiopian kale and spider plant to organic and plastic mulch

## Materials and Method

**Experimental site:** Jomo Kenyatta University of Agriculture and Technology (JKUAT) farm, Juja-Kenya, (lat. 1°10'48"S, long. 37°07'12"E, alt. 1525 masl)

**Layout:** - In open field  
- 5m by 4m plots  
- Ethiopian kale and spider plant

**Period:** February to March 2016

**Treatments:** Organic mulch, plastic mulch and a control without mulch

**Replications:** 4



Plastic mulch on Ethiopian kale

### Measurements:

- Leaf length
- Plant height
- Shoot and root dry weight
- Leaf area index by LAI-2200C
- Leaf temperature using FLIR T-series Infra red camera
- Soil temperature by tiny tags

## Results

### Plant height

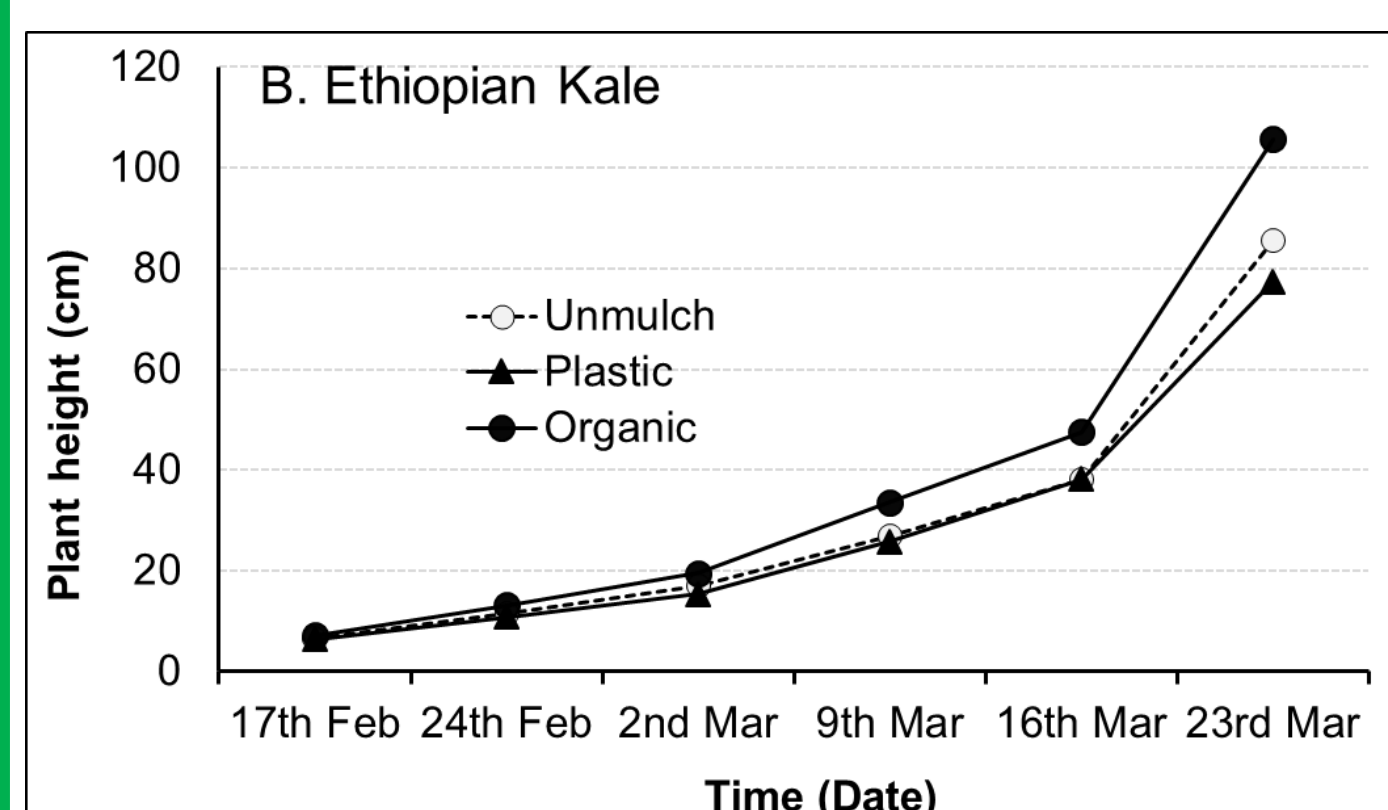
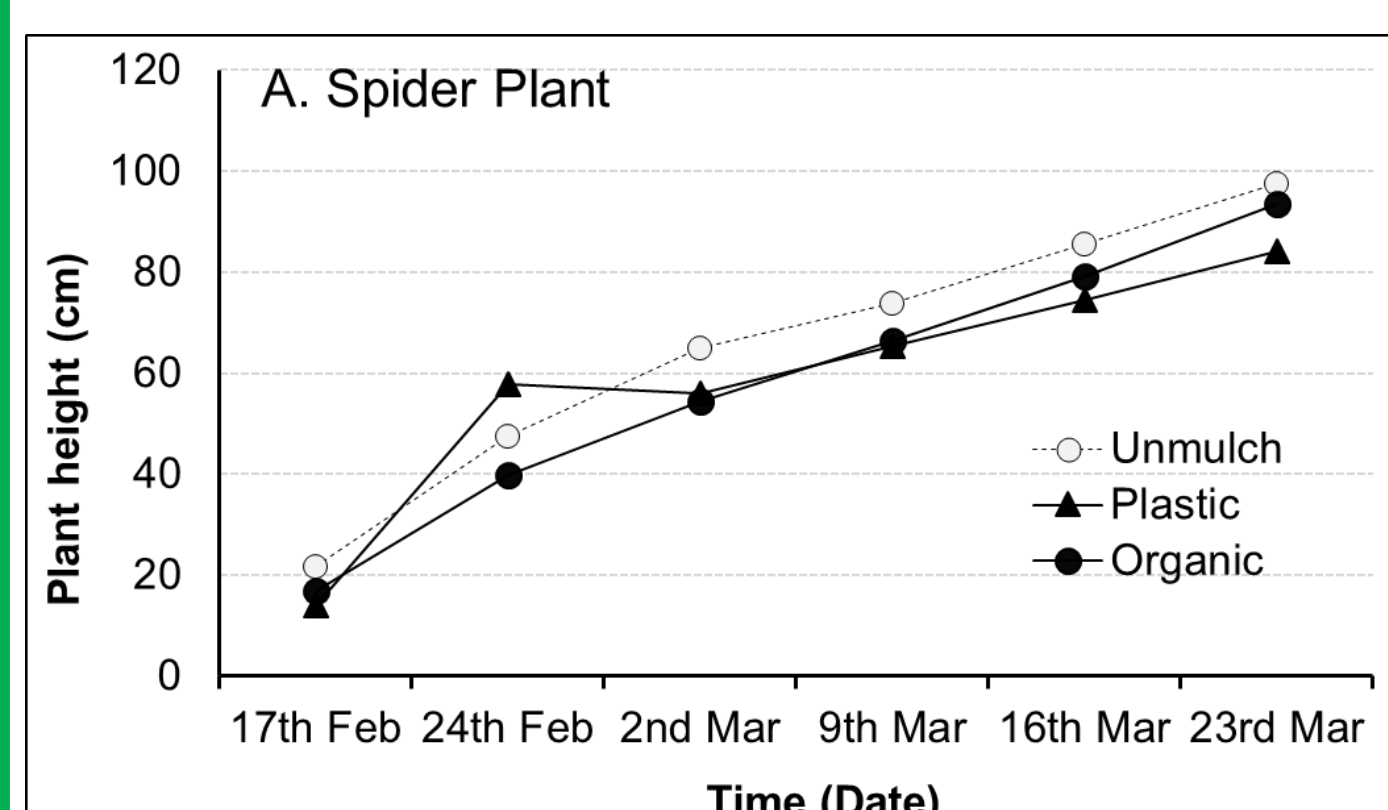


Fig 1: Plant height of A. Spider Plant and B. Ethiopian kale affected by mulch type

### Leaf area index, root dry weight, shoot dry weight and leaf temperature

Table 1A: Leaf Area Index (LAI), Root dry weight, shoot dry weight and leaf temperature of Spider Plant as affected by mulch type

Mulch type	LAI	Root dry Weight (g)	Shoot dry weight (g)	Leaf Temperature (°C)
Un-mulched	1.8 (0.33)	9.6 (3.55)	285.7 (8.45)	30.4 (0.14)
Plastic	3.0 (0.92)	13.5 (12.86)	263.5 (8.12)	30.5 (0.16)
Organic	2.9 (0.65)	6.7 (5.33)	170.7 (6.53)	30.4 (0.55)
P-value	0.06	0.53	0.31	0.73
F	3.97	0.68	1.33	0.33

Table 1B: Leaf Area Index (LAI), Root dry weight, shoot dry weight and leaf temperature of Ethiopian Kale as affected by mulch type

Mulch type	LAI	Root dry Weight (g)	Shoot dry weight (g)	Leaf Temperature (°C)
Un-mulched	2.1 (0.32)	16.3 (5.61)	109.6 (33.99)	26.9 (0.86)
Plastic	3.3 (1.43)	25.5 (5.49)	109.9 (30.72)	27.0 (0.31)
Organic	3.0 (0.46)	22.9 (12.60)	109.9 (39.49)	26.7 (0.56)
P-value	0.20	0.34	1.00	0.79
F	1.90	1.23	0.00	0.24

### Soil Temperature

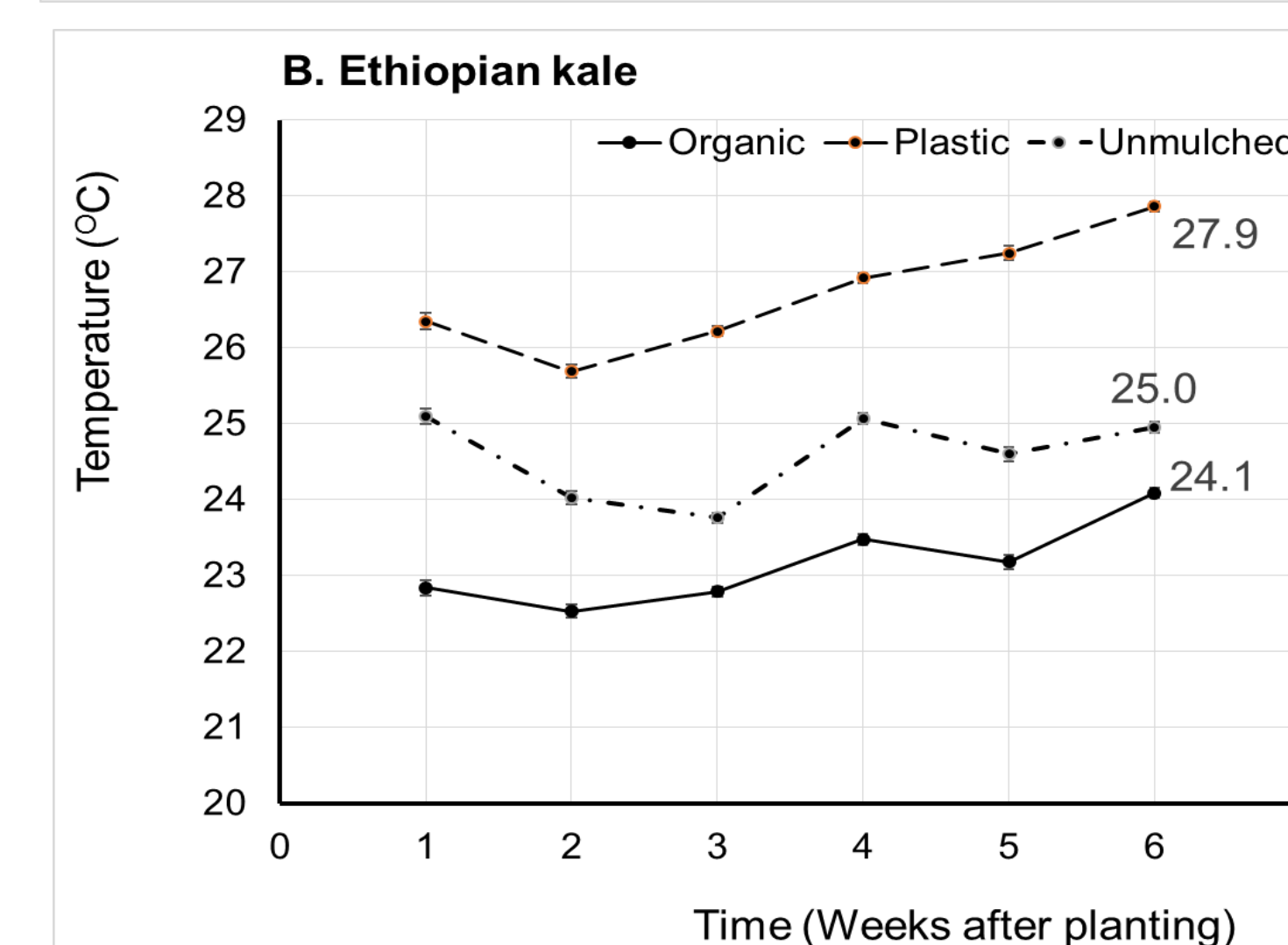
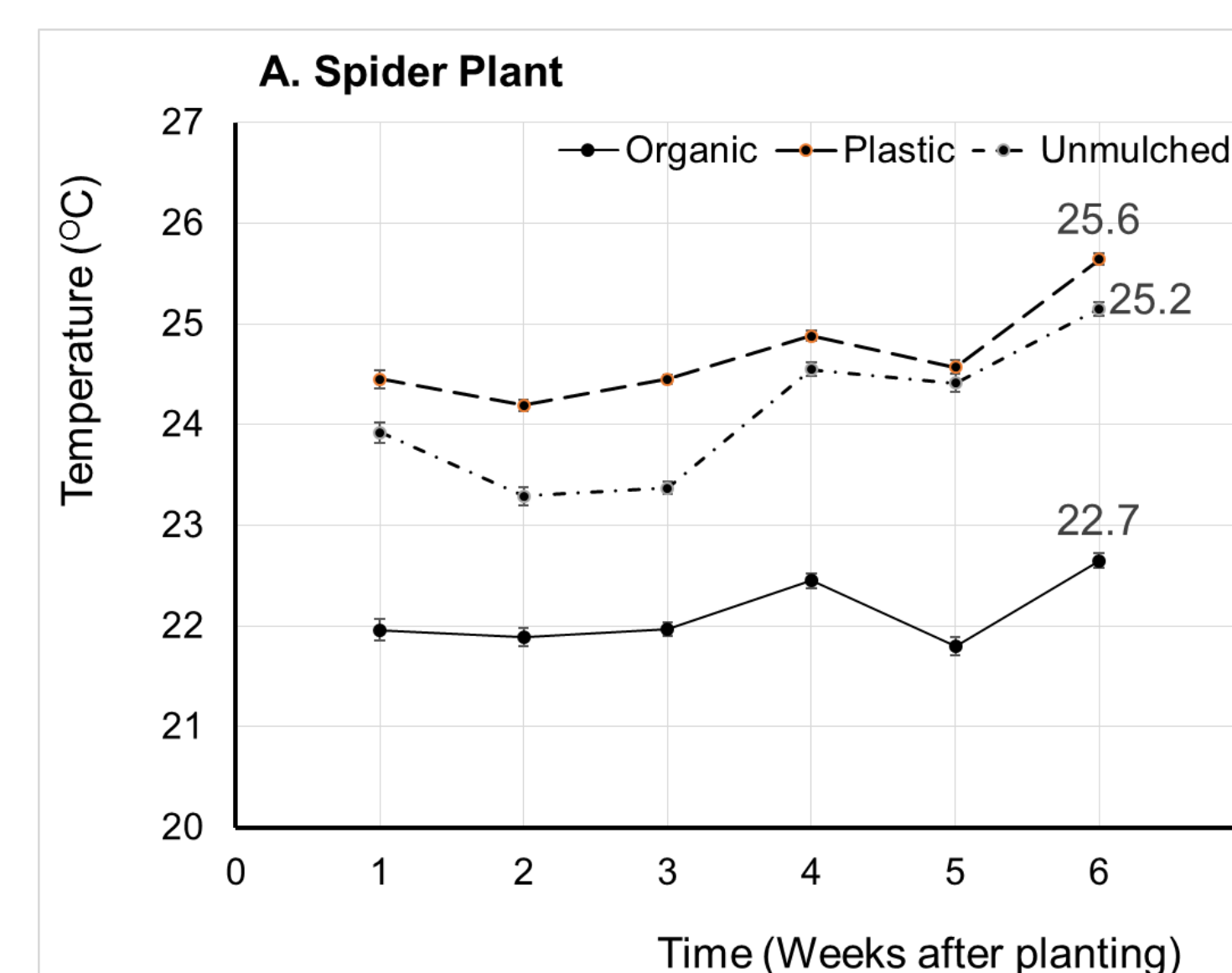


Fig 2: Soil temperature of A. Spider Plant and B. Ethiopian kale affected by mulch type

- Leaves expansion followed a sigmoid shape differed significantly among the mulches for both vegetables ( $P < 0.01$ ) (**Data not shown**).
- There was a significant difference in plant height among the mulch types for Ethiopian kales ( $P < 0.01$ ) and no significant difference for spider plant (**Fig. 1A & B**).
- The final height of Ethiopian kales was 106 cm under organic mulch compared to 78 cm and 86 cm under polythene and un-mulched respectively (**Fig. 2B**).
- Shoot dry weight, root dry weight, leaf area index and leaf temperature did not differ significantly among the mulch treatments in both vegetables (**Table 1A & B**).
- The soil temperature of organic mulch (22.7°C for Kales and 24.1°C for Spider plant) and plastic mulch (25.6°C and 27.9°C in Ethiopian kales and spider plant respectively) differed significantly (**Fig. 2A & B**).

## Conclusion

- The results showed that mulch type influenced vegetative growth probably through the effects on soil temperature.
- It may be concluded that under limited water conditions, hay mulching will be beneficial for Spider plant and Ethiopian Kales production
- It is able to maintain better soil and plant water status resulting in higher leaf yields and enhanced water use efficiency

### References

1. Jaetzold, R., Schmidt, H., Homet, Z. B. & Shisanya, C. A. 2007. Farm Management Handbook of Kenya. Natural Conditions and Farm Information. Eastern Province Ministry of Agriculture/GTZ, Nairobi, Kenya

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