



EFFECT OF OPEN SHADE CONDITIONS ON THE PHYTOCHEMICAL CONTENT OF SOME MEDICINAL PLANTS

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ABSTRACT: *Vernonia amygdalina* (bitterleaf), *Telfaria occidentalis* (Fluted pumpkin) and *Acalypha wilkesiana* plants were grown under open field and open shade. *V. amygdalina* is used to treat stomach infections, *T. occidentalis* (Fluted pumpkin) is used as a blood tonic and *Acalypha wilkesiana* is effective in the treatment of skin infections. Plants were grown in planting bags placed in these sites. Results show that all the plant species have better vegetative growth under direct sunlight. However, phytochemical screenings of the leaves of the plants reveal that the effect of open shade conditions enhance the synthesis and accumulation of bioactive compounds with medicinal values. The effect is however not specific to the type of phytochemical but it is actually species specific. Open shade condition enhances the production and accumulation of flavonoids while it inhibits that of anthraquinone in *V. amygdalina*. Also, flavonoid content of *T. occidentalis* plants was enhanced under open shade conditions. The same conditions did not affect the flavonoid and anthraquinones content of *A. wilkesiana* but leaves of the plant under open shade conditions had higher concentration of tannin than those grown under open field condition. Saponin was also found present in *A. wilkesiana* plants grown under open shade condition while it was absent in those under open field conditions. The conclusion is that, though direct sunlight help ensure better vegetative growth, open shade enhance the synthesis and accumulation of bioactive compounds with medicinal values.

INTRODUCTION: The dry season which constitute a wide period of the year across most of Africa. affects the yield and nutrient content of the crop and the degree of weed infestation on the farms (Okugie and Ossom 1988). Farmers now grow vegetables under open shade conditions in the dry season to conserve water and avoid high temperature. However, shade imposes a limitation to biological productivity in plant, although the extent of the limitation varies with shade tolerance of the species and the nitrogen supply (Wong, 1991). Plants, in reaction to stress can produce a wide range of secondary metabolites which are not essential for their primary metabolism (Croteau *et al.*, 2000). The study therefore aimed at analysing the effect of open shade condition on the phytochemical content of *Vernonia amygdalina* (bitterleaf), *Telfaria occidentalis* (Fluted pumpkin) and *Acalypha wilkesiana* plants. *V. amygdalina* is used to treat stomach infections, *T. occidentalis* (Fluted pumpkin) is used as a blood tonic and *Acalypha wilkesiana* is effective in the treatment of skin infections.

MATERIALS AND METHODS: The open field site is defined by direct sunlight and warm air while open shade site is defined by low light and cool air. . The temperature of the open field site was 3.5 °C higher than that of the open shade, while the light intensity of the open shade site was about 23.5 to 50.8 % lower than that of the open field site. For each plant species, canopies made up of wire gauze nets and a transparent polythene sheet roof was constructed on both sites. A set of twelve bags were placed in the open field canopy, while another set of twelve bags were placed in the open shade canopy. *T. occidentalis* was grown from seed while *Vernonia amygdalina* and *Acalypha wilkesiana* were grown from stem cuttings. Seedlings were transplanting into planting bags at sites by 14 days after sowing. Plants in all sides were watered same period every day. Phytochemical screenings were carried out on leaves of plants at 56 days after transplanting according to the methods described by Trease and Evans, (1989). Screenings were carried out in triplicate using randomly selected leaves.

RESULTS AND DISCUSSION: All species showed better morphological growth under open field than open shade (Fig. 1-3).

It was also observed that *A. wilkesiana* leaves turned into the typical reddish color of the variety used by 56 day after transplanting while those under open shade remained green (Fig.3).

Table 1 shows the results of the phytochemical screening of plants grown. Leaves of *V. Amygdalina* and *T. Occidentalis* plants under open shade had more flavonoids, an indication of higher antioxidant value than leaves of plants under the open field.

Anthraquinones were observed in leaves of *V. amygdalina* plants under open field, but were completely absent in leaves of plants under open shade, thus the plants grown under open shade may not have laxative effect when consumed. Ayoola *et al* (2008) reported the absence of anthraquinones in *V. amygdalina*, however the condition under which the plants were grown was not stated.

Leaves of *A. wilkesiana* plants under open shade conditions had higher concentration of tannin and presence of saponin, which will make the plants toxic if consumed at higher concentration. Yusha'u *et al.*, (2008)'s phytochemical screening showed the absence of saponin in leaves of *A. wilkesiana*, though the condition under which the plants were grown was however not stated.

CONCLUSION: The growth condition under which a medicinal plant is grown can definitely affect the medicinal value of the plant. However, plants are commonly harvested from the wild in Africa for medicinal use without cognizance of the growth condition of the plant. The results of this study shows that differences in the growth condition may account for the disparity in the effectiveness of the different samples of a species used to treat same ailment. More research need to be conducted to determine the specific growth condition required to bring out the best medicinal value of a particular plant.



Fig. 1a: *Vernonia amygdalina* plants at 56 days after transplanting (open air)



Fig. 1b: *Vernonia amygdalina* plants at 56 days after transplanting (open shade)



Fig. 2a: *Telfaria occidentalis* plants at 56 days after transplanting (open air)



Fig. 2b: *Telfaria occidentalis* plants at 56 days after transplanting (open shade)



Fig. 3a: *Acalypha wilkesiana* plants at 56 days after transplanting (open air)



Fig. 3b: *Acalypha wilkesiana* plants at 56 days after transplanting (open shade)

Table 1: Phytochemical constituents of leaves of *Vernonia amygdalina*, *Telfaria occidentalis* and *Acalypha wilkesiana* at 56 days after transplanting.

TEST	SPECIES	OPEN AIR	OPEN SHADE
Alkaloids	<i>V. amygdalina</i>	+	+
	<i>T. occidentalis</i>	+	+
	<i>A. wilkesiana</i>	+	+
Flavonoids	<i>V. amygdalina</i>	+	++
	<i>T. occidentalis</i>	+	++
	<i>A. wilkesiana</i>	+	+
Tannins	<i>V. amygdalina</i>	+	+
	<i>T. occidentalis</i>	-	-
	<i>A. wilkesiana</i>	+	++
Cardiac glycosides	<i>V. amygdalina</i>	+	+
	<i>T. occidentalis</i>	+	+
	<i>A. wilkesiana</i>	+	+
Anthraquinones	<i>V. amygdalina</i>	-	+
	<i>T. occidentalis</i>	-	-
	<i>A. wilkesiana</i>	+	+
Saponins	<i>V. amygdalina</i>	+	+
	<i>T. occidentalis</i>	-	-
	<i>A. wilkesiana</i>	-	+

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