



Response of two Chilli Pepper Varieties (*Capsicum frutescens* L.) to Harvesting Frequency

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ABSTRACT

A field experiment was carried out in 2007, 2008 and 2009 at Samaru, Zaria, Nigeria to determine the response of two Chilli pepper (*Capsicum frutescens* L.) varieties (Bird's eye and Dantsiga) to five harvesting frequencies (weekly, two weeks, three weeks, four weeks and once at the end of the rains). Factorial combinations of the treatments were replicated three times and laid out in a randomized complete block design. Gross and net plots were 9m² and 4.5m² respectively. A spacing of 75cm x 30cm was used. Appropriate agronomic and crop protection practices were adopted to ensure adequate crop performance. The results showed that variety Dantsiga had significantly longer fruits, higher fruit diameter, number of seeds per fruit and dry fruit yield per hectare. There was no difference between the two varieties in the number of fruits per plant. Harvesting every two weeks resulted in significantly higher fruit yield and number of seeds per fruit throughout the three years of study.

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Introduction

Chilli pepper (*Capsicum frutescens* L.) is a high value crop that is grown for cash by farmers all over the world. Although the crop is an annual, it can be grown as a perennial where there is constant supply of water (Yamaguchi, 1983). In Nigeria, the crop has responded positively to improved nutrition and appropriate agronomic practices (Aliyu, 2000; 2001; 2002; 2003; Yahaya *et al.*, 2010).

In view of the increasing concern for the environment, attempts to further increase yield by increased inorganic fertilizer applications has not met with favourable response. The global demand for organic produce has also added to the decline in the use of inorganic fertilizers and other agrochemicals for increased agricultural productivity (Aliyu, 2003; Aliyu and Yahaya, 2011).

Harvesting has been known to have a significant influence on the quality of produce from most horticultural crops. Most farmers have no definite pattern or procedure for harvesting chilli pepper. Whereas some harvest regularly till the end of the rains, others allow the crop to fruit and dry before harvesting at the end of the rainy season. The frequency of harvesting as it affects different varieties of chilli pepper has not been documented. The scope of this research was to determine the best harvesting frequency for two chilli pepper varieties that could be used to increase yield.

Materials and Methods

A field experiment was carried out at the research farm of the Institute for Agricultural Research, Samaru, Zaria, Nigeria (11° 11' N, 07° 38' E; 686m altitude) during the wet seasons of 2007, 2008 and 2009. The treatments consisted of factorial combination of two varieties (Bird's eye chilli and Dantsiga) and five harvesting frequencies (Weekly, two weeks, three weeks, four weeks and once at the end of the rains). A randomized complete block design was used with three replications.

Gross plot of 9m² and net plot of 4.5m² were used. Row spacing of 75cm and plant spacing of 30cm were adopted. The crop was transplanted after five weeks in the nursery each year. Transplanting dates were 4th July in 2007, 12th July in 2008 and 2nd June in 2009. Appropriate agronomic practices were conducted to ensure good crop performance.

Data were collected on yield and yield components. These were analyzed statistically in accordance with Snedecor and Cochran (1967). The means were compared using Duncan's New Multiple Range Test (Duncan, 1955).

Result and Discussion

The response of two varieties of chilli pepper to different harvesting frequencies is presented in Tables 1 and 2. Chilli variety Dantsiga proved significantly superior to Bird's eye chilli in terms of fruit length, diameter, number of seeds per fruit and dry fruit yield throughout the period of trial. Dantsiga is an improved local variety that was released by IAR in the 1980s. It has long fruits and is high yielding. Previous studies have shown that varieties of pepper differ significantly in both morphological, yield and yield character (Aliyu *et al.*, 1995). The two varieties were however, statistically comparable in number of fruits per plant.

Harvesting once at the end of the rainy season resulted in significantly higher fruit length and diameter compared with other harvesting frequencies which were statistically at par. This could be due to the length of time the fruits were allowed on the plant before eventual harvesting. Harvesting every two weeks however resulted in significantly higher number of seeds per fruit and dry fruit yield in the three years of study. This could be due to the fact that regular removal of fruits increases the capacity of the source (leaves) to produce more assimilate and channel it to the sink (fruits). Source – sink relation, in crop plants has been established that developing buds and

meristematic regions in plants place demand on the available assimilate and compete successfully as sinks with developing leaves (Wardlaw, 1968). The onset of flowering and subsequent fruit development have a marked effect on the redistribution of assimilates; fruits develop at the expense of vegetative growth (Beevers, 1969). Chilli pepper is a long season indeterminate crop and could be grown as a perennial with regular supply of water hence the increase in yield with regular harvesting at two weeks interval.

In this study, the best yield was recorded in 2009, a year which had the highest total rainfall and favourable temperature (Tables 3). In addition the crop was planted earlier due to early establishment of rain in 2009 thus the improved yield in that year. Although weekly harvesting had the highest number of fruits per plant, the difference was not significant compared with other treatments. Too much handling of plants has been reported to interfere with plant growth and development (Gomez and Gomez, 1976). This could explain the lower yield from weekly harvesting compared with two weeks.

Previous studies have reported significant yield increase and profits with fertilization (Yahaya et al. 2011). However, increasing concern for the soil and environment has led to research into alternative non-chemical ways of crop and yield improvements (Aliyu, 2008). Global demand for organic produce has also resulted into the need to develop organic methods of crop production and procedures for yield improvement that do not involve chemicals. This study has shown that the yield of chilli could be improved by manipulating the harvesting frequency.

Conclusion

Chilli variety Dantsiga significantly out yielded Bird's eye chilli. Harvesting every two weeks resulted in significantly higher yield of dry fruits and number of seeds per fruit.

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References

Aliyu, L.; Olarewaju, J.D.; Lawal, A.B. and Adamu, R (1995). Characterizations of pepper varieties. In Babatola J.O. et al. (eds.) Proc. Of the 13th Annual Conference of Horticultural

Society of Nigeria, Kwara ADP, Ilorin, 12th March, 1995, pp. 73-76.

Aliyu, L. (2000). The effects of organic and mineral fertilizers on growth, yield and composition of pepper. *Biological Agriculture and Horticulture*. 18(1): 29-36.

Aliyu, L. (2001). Effects of Nitrogen and Phosphorus on growth and yield of pepper. *Journal of Agriculture and Environment*. 2 (2): 243-251.

Aliyu, L. (2002). Growth and yield of pepper as affected by nitrogen, phosphorus and plant density. *Crop Research* 23 (3), 467-475.

Aliyu, L. (2003). Effect of manure type and rate on the growth, yield and yield components of pepper. *Journal of Sustainable Agriculture and the Environment*. 5(1): 92-98.

Aliyu, L. (2008). Priority *Capsicum* Production for Export in Nigeria. Invited Paper presented at the 1st National workshop on spices. 2nd – 3rd Dec., 2008, NIHORT, Ibadan.

Aliyu, L. and Yahaya, R.A. (2011). Best Agronomic Practices for fruits and vegetables production. Invited paper presented at a National workshop on challenges and prospects of increasing the productivity of fruits and vegetables in Nigeria. Organized by National Productivity Centre. 26th – 28th July, 2011, NAERLS, ABU, Zaria.

Beevers, H. (1969). *Metabolic Sinks*. In "Physiological Aspects of Crop Yield". American Soc. of Agronomy, 169-180.

Duncan, D.B. (1955). Multiple Range and Multiple F-Test. *Biometrics II*: 1-42.

Gomez, K.A. and Gomez A.A. (1976). *Statistical Procedures for Agricultural Research*, IRRI, Los Banos, Philippines, p.294.

Snedecor, G.W. and Cochran, W.G. (1967). *Statistical Methods*, Iowa State University Press, USA, p. 456.

Wardlaw, I.F. (1968). The control and pattern of movement of carbohydrate in plants. *Botanical Review*. 34:39-105.

Yamaguchi, M. (1983). *World Vegetables: Principles, production and nutritive values*. Ellis Horward Ltd. England, 463pp.

Yahaya, R.A.; Aliyu, L. and Mahmud, M. (2010). Effects of sheep manure and intra-row spacings on yield and yield components of chilli pepper at Samaru, Nigeria. *Production Agriculture and Technology* 6 (2): 45-50.

Yahaya, R.A.; Aliyu, L.; Ahmed, M.R. and Odion, E.C. (2011). Cost and return analysis of chilli pepper production at Samaru, Zaria, Nigeria. *Best Journal*. 8(1): 43-45.

Table 1: Effect of Harvesting frequency on the yield components of chilli pepper varieties at Samaru, 2007 – 2009 combined.

Treatment Variety	Number of fruits per plant	Fruit length (cm)	Fruit Diameter (cm)	Number of seeds per fruit
Bird's eye	268.83	2.14b	1.25b	38.03b
Dantsiga	276.66	4.84a	2.67a	52.39a
SE(±)	19.262	0.116	0.061	1.023
Harvesting frequency				
Weekly	322.67	3.18b	1.77b	34.75c
Two weeks	307.98	3.47b	1.92b	70.65a
Three weeks	247.08	3.25b	1.85b	45.20b
Four weeks	240.12	3.48b	1.93b	67.17a
Once	280.14	4.08a	2.33a	36.40bc
SE±	30.459	0.184	0.097	2.557

Means followed by unlike letter(s) within the same treatment column are significantly different at 5% using DNMRT.

Table 2. Effect of Harvesting frequency on dry fruit yield of pepper at Samaru.

Treatment	Dry Fruit Yield (t/ha)		
	2007	2008	2009
Variety			
Bird's eye	0.57b	0.38b	1.10b
Dantsiga	1.01a	0.89a	2.18a
SE(±)	0.094	0.023	0.191
Harvesting frequency			
Weekly	0.82ab	0.67b	1.65b
Two weeks	1.11a	0.97a	2.22a
Three weeks	0.78b	0.78b	2.04ab
Four weeks	0.68b	0.56b	1.71b
Once	0.56b	0.19c	0.57c
SE±	0.149	0.096	0.302

Means followed by unlike letter(s) within the same treatment column are significantly different at 5% DNMR.

Table 3. Meteorological Data during the Period of experiment

Month	Rainfall (mm)			Max. Temperature °C		
	2007	2008	2009	2007	2008	2009
April	Nil	Nil	20.3	35.1	35.6	35.0
May	150.3	95.2	85.1	31.2	34.9	35.6
June	208.5	111.7	89.5	30.1	33.1	33.2
July	228.6	201.3	285.0	30.0	30.9	31.3
August	298.6	352.6	439.7	31.5	29.7	30.0
September	31.6	217.5	206.7	34.5	31.2	31.9
October	8.3	89.0	151.7	33.4	33.2	32.8
November	Nil	Nil	Nil	32.4	32.5	32.4
Total	926.2	1067.3	1278.4			

Source: IAR Samaru Meteorological Unit.