

EVALUATION OF FOUR LOCAL TYPES OF HOT PEPPER (*Capsicum annuum*) IN THE FOREST ZONE OF GHANA

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ABSTRACT

The performance of four local types of hot pepper (*Capsicum spp.*) locally named Makowham, Kpakpo Shito, Ntonkom (Akwele waabi) and Mesewa were evaluated. The plants were grown on plots arranged in a complete randomised design with four replications. Observations on vegetative growth revealed wide differences in plant form and susceptibility to some common diseases, such as the wilt disease. Significant differences were recorded between the types in their anthesis, date to first harvest, mean fruit yield and seed yield. There was also an indication of low seed viability for almost all lines.

Based on the results obtained, apart from Mesewa, all other types can be recommended for fruit and seed production in the forest area of Ghana but further work need to be done to confirm the findings. Mesewa, however, can be grown for fruits to be harvested green for local markets. If growing Mesewa for ripe fruits, protection againsts bird damage would have to be provided

Key Words: Hot pepper, performance, yield, quality.

INTRODUCTION

Hot peppers (*Capsicum spp.*) have been grown in Ghana for a long time and have assumed an important role with the potential as an export crop either fresh or in the dry form [1].

Hot pepper is a condiment and a stimulant, [2] and its inclusion in the diet is useful for digestion [3]. Suitable soil for pepper growing is available in Ghana, so the crop is grown on a relatively large scale. Some commercial producers obtain their seedlings from market women who raise them from seeds of unknown quality, private seed producers, or by raising their own seedlings from saved seeds (usually from unmarketable fruits, which are therefore of poor quality). The need to evaluate some of the most promising and desired varieties for future improvement is therefore long overdue.

In an introductory trial, several hot pepper germplasms, which were obtained from the local markets, Crops Research Institute and from the Department of Horticulture were screened. After several trials four were found to be most suitable for growing during the dry season, with irrigation, selecting according to the yield of the fruits in the Kumasi area. These were also found to be quite popular with users.

Their local names Makowham, Ntonkom, Kpakpo Shito and Mesewa respectively have been used in the text. An experiment was therefore designed to study the performance of these four types during the major rainy season, concentrating on the yield and quality of the fruits and seeds.

MATERIALS AND METHODS

The experiment was conducted, using four local hot pepper types, Makowham, Kpakpo Shito, Mesewa and Ntonkom. It was set up, using a completely randomised design with four replications.

The seeds were sown in seed boxes on January 28th, 1996 pricked out a fortnight later and hardened until 10th, March 1996. The seedlings were transplanted five weeks after pricking out, at the spacing of 90 × 90 cm. Seedlings were then between 10 and 15 cm high with an average of four true leaves. The plots received pre-planting complete fertiliser (15 - 15 - 15 NPK) treatment by broadcasting at 300 kg/ha. Plots were 6 × 4.8m but border plants were excluded leaving out 4.5 × 3.6m for sampling and data collection.

The plots were mulched with dried straw. The plants were sidedressed with sulphate of ammonia after fruit set, and this was repeated three times more at fortnightly intervals to provide 50kg N, 120kg P₂O₅ and 50kg K₂O per hectare after Mathai (4). A mixture of cupric hydroxide and 250g/l of Pirimophos methyl was sprayed at weekly intervals to minimise fungi and vectors of virus infections respectively.

Parameters recorded included number of days to anthesis and first harvest, fresh fruit yield and seed quality. For the yield, fruits were harvested at red ripe stage. After each harvest, the number of fruits, and fruits weight were recorded. The seeds were extracted by hand, from one hundred fruits, selecting them randomly from each plot. The extracted seeds were then air-dried to a low moisture level (about 10% moisture content) and weighed. The thousand seed weight was also recorded and germination tests were conducted based on a modified International Seed Testing Association (ISTA) rules and regulations [5] using University of Science and Technology Seed Compost [6]. Normal seedlings were counted at 8 and 14 days for the first and final counts respectively, as suggested by the rules [5].

RESULTS AND DISCUSSION

The data collected on the experiment are summarised in the Tables. Generally, Mesewa showed slow germination, taking 20 to 23 days to emerge after sowing. However, it was observed that it was able to withstand moisture stress much more than the three other types, which all germinated within 14 days after sowing. Therefore Mesewa perhaps would be suitable for growing in areas with less rainfall, or during the dry season.

There were diseases like bacterial wilt and *Sclerotium* wilt but only very few plants were affected. These were removed and destroyed. Some plants were also attacked by curly top and pepper leaf vein mosaic viruses and Mesewa was the most severely affected. The plants however recovered after a few weeks, and new leaves and fruits developed.



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TABLE 1: Data On Fruit Yield Of Four Hot Pepper Varieties

HOT PEPPER VARIETIES	TOTAL FRUIT NUMBER PER (19.4M Sq.)	MEAN NUMBER OF FRUITS PER PLANT AT PEAK HARVEST	MEAN WEIGHT PER FRUIT (g)	MEAN YIELD PER HECTARE (TONNES)
<i>Makowham</i>	1443a*	24.6	4.7	11.56a
<i>Kpakpo shito</i>	1314a	27.7a	1.85	3.60b
<i>Ntonkom</i>	734b	17.2a	4.20	4.56b
<i>Mesewa</i>	73c	5.1b	0.52	0.50c
C1%	19.15	19.15	37.98	19.11
LSD 5%	4.98	4.98	1.23	5.56

* Values in a column followed by the same letters are not significantly different (DMRT).

TABLE 2: Data On Mean Seed Yield, Size And Germination Percentage Of Hot Pepper Varieties.

HOT PEPPER VARIETIES	TOTAL SEED NUMBER PER FRUIT (MEAN OF 100 FRUITS)	1000 SEED WEIGHT (g)	MEAN GERMINATION PERCENTAGE (%)	MEAN MOISTURE CONTENT (%)
<i>Ntonkom</i>	62.2a*	5.14a	87.7	9.0
<i>Makowham</i>	47.5b	4.60	74.2	9.8
<i>Kpakpo shito</i>	23.8c	5.63a	66.5	9.5
<i>Mesewa</i>	30.1b	3.88b	48.2	10.0

* Values in a column followed by the same letters are not significantly different (DMRT).

Plant height was almost uniform for the *Mesewa* and *Kpakpo Shito*, but there were wide variations in the *Ntonkom* and *Makowham* plants. This implies that there is the need to continue the selection of the last two types to improve their uniformity. The mature plants of *Makowham* were found to be slightly larger than expected and thus overcrowded their plots by the end of the experiment. Future trials would have to consider wider spacing for it. Fruit colour at mature stage, size and shape varied between the lines but for each type, the characters were distinct, but not uniform. Fruiting behaviour was quite different for *Mesewa*. The blossom end of the fruits pointed upwards and this characteristic perhaps made the fruits to be very susceptible to bird attack.

The first fruits of *Mesewa* were harvested 105 days after transplanting, while the other three types took between 93 and 100 days to reach harvestable stage. This was much later than documented observation [8]. Norman [9] reported that both annual and perennial hot pepper are ready for harvesting 8 to 9 weeks after planting out. Some flower buds, flowers and small fruits dropped during the early reproductive period. This was probably caused by the slightly low humidity with the relatively high temperature during that period. The day temperatures ranged between 21.6° to 32.3° while the relative humidity was between 40% to 60%. As fruiting continued, the dropping of fruits ceased as the rains became more frequent and the relative humidity increased to above 75%.

FRUIT YIELD

Data on fruit yield are presented in Table 1. There were highly significant differences between the varieties in total fruit yield in number and in weight. The highest yield

was from *Mesewa* followed by *Kpakpo Shito* in fruit number. *Mesewa* had the least number of fruits amongst all the types. These trends were followed in all the yield data except for the mean number of fruits at peak harvest. *Kpakpo Shito* had the highest number of fruits per plant (27.7). Mathai [4] indicated that in Zambia, fruit yields of 2 tonnes/hectare of dry pods (equivalent of 6 tonnes/hectare of fresh fruits) can be expected from the *Mufalira* cultivar whose description is similar to that of *Makowham*. The yield of *Makowham* was rather high, but still lower than that of some hot pepper cultivars from which between 30 and 55 tonnes of fruits per hectare can be harvested. [9,10]. Higher yield may be expected where irrigation is used in growing the crop [9]. *Makowham* also produced the heaviest fruits (4.71g) whilst *Mesewa* fruits were the smallest and lightest (0.52g). Fruits of *Kpakpo Shito* were roundish, but intermediate in size (1.85g). As harvesting progressed, fruit size reduced for all varieties. The fruit quality was not fully assessed, but in future trials, the drying quality will have to be investigated. The fruits are sold in the dried form in the country during the dry season (between November and February), when fresh fruits are usually scarce.

Seed Yield and Quality

Ntonkom produced the highest seed yield in terms of mean seed number per fruit. It produced a mean of 62.2 as against 47.5, 30.1 and 23.8 for *Makowham*, *Mesewa* and *Kpakpo Shito* respectively. Using the 1000 seed weight as a measure of the seed size revealed *Kpakpo Shito* to have the biggest seeds. The average seed yield expected was about 200g/ha [7] or 140 seeds per gramme [8]. There is very little information available on the yield and quality of the seeds of the hot pepper cultivars grown in this country. Two varieties *Ntonkom* and *Makowham* grown in this experiment had high seed yield (about 62 and 47 seeds per fruit) while the small fruited-varieties (*Kpakpo Shito* and *Mesewa*) had low seed yield (about 23 and 30 seeds per fruit respectively) but all were below rates obtained elsewhere of similar tropical condition [7].

All the varieties had seeds of average size, with *Mesewa* producing the smallest and lightest seeds, though statistically not different from *Makowham*. Smith, Welch and Little [10] reported that larger lettuce seeds produced heavier seedlings and that meant more vigorous seeds. Thus the low germination percentage 48.2% accompanied by the delayed or slow germination could be partially due to this reduced seeds size of *Mesewa* among the four evaluated types.

CONCLUSIONS

The four hot pepper types evaluated are quite popular in most Ghanaian homes and depending on the area, a particular type may be widely grown. There is also a small, but growing export trade, of both fresh and dry fruits, now in Ghana. Differences were recorded in almost all parameters studied in the experiment. For seed production, recommended spacing and fertilization (as for fruit production), could conveniently be used for all four varieties, but rainy season production of *Ntonkom* would need wider spacing. Selection should be rigorously tackled for *Ntonkom* and *Makowham* to keep their uniformity and stability. Seed crops of *Mesewa* would need to be protected from insect and bird attack, to reduce virus infection.

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