# Yield performance of four cauliflower *(Brassica oleraceae* L.) varieties under open field conditions in Seychelles

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**ABSTRACT**

A field experiment was used, from March to September 2005 and 2006, to evaluate the yield performance of three cauliflower (*Brassica oleraceae* L.) varieties, 'Amazing', 'Clima' and 'Rami', against the commonly grown variety 'Tropical Extra Early' under open field conditions at the Vegetable Evaluation and Research Station Farm at Anse Boileau, Seychelles. The experiment consisted of four treatments laid out in a randomized complete block design with five replications. The results showed that while 'Tropical Extra Early' was the earliest to mature, the highest curd length and curd width were produced by 'Rami'. Similarly, 'Rami' produced the largest curd circumference, largest curd weight, and best yield. 'Rami' significantly improved yield at $P$ = 0.05 by 32.2 and 30.0 per cent in 2005 and 2006 respectively, compared to that recorded for the regular variety 'Tropical Extra Early'. 'Rami' could, therefore, be considered as a potential replacement for the common variety 'Tropical Extra Early'.

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**RÉSUMÉ**

IJOYAH, M. O. & RAKOTOMAVO, H. : *Évaluation de rendement de quatre variétés de chou-fleur (*Brassica oleraceae *L.) sous des conditions de terrain non clôturé aux Seychelles.* Une expérience sur le terrain a été effectuée de Mars à Septembre 2005 et 2006 au champ de Station de Recherche et d' Evaluation de Plante Végétale à Anse Boileau, Seychelles, pour évaluer le rendement de trois variétés de chou-fleur, 'Amazing', 'Clima' et 'Rami' contre la variété généralement cultivée, 'Extra Précoce Tropique' sous des conditions de terrain non clôturé. L' expérience consistaient en quatre traitements établis dans un dessin de bloc complet choisi au hasard avec cinq réplications. Les résultats obtenus montraient que tandis que la variété 'Extra Précoce Tropique' était la toute première à arriver à maturité, la longueur de curd et la largeur de curd les plus élevées étaient produits par la variété 'Rami'. De la même façon, 'Rami' produisaient la plus grande circonférence de curd, la plus grande poids de curd et le rendement meilleur. La variété 'Rami' améliorait le rendement considérablement à $P$ = 0.05 par 32.2 et 30.0% respectivement dans les années 2005 et 2006 comparé à ce qui est obtenu de la variété régulière 'Extra Précoce Tropique'. La variété 'Rami' pourrait donc être considérée comme un potentiel de remplacement pour la variété commune 'Extra Précoce Tropique'.

## Introduction

Cauliflower (*Brassica oleraceae* L.) is one of the world's major vegetable crops (Moamogwe, 2002). It is a biennial normally grown as an annual for its head or 'curd'. It is a cool season crop, which is thought to have originated in the Mediterranean region on the island of Cyprus. From there, it moved to other areas like India, Malaysia, the Philippines, Central and East Africa, Central America, Europe, the Caribbean and highland areas of many tropical regions (Ondere, 2000). The crop is used as a cooked vegetable in salads, and sometimes included in preparing condiments and soup (Choudhury, 1992).

In Seychelles, the demand is increasing for the cultivation of cauliflower to meet the needs of the urban markets. Cauliflower is one of the priority vegetable crops in the diet of the Seychelles people (Grubben, 1997). The commonly grown variety is the 'Tropical Extra Early'. It is now the only variety available with an average yield of 4 t $ha^{-1}$ (Estico, 2000). This was considered low, especially when compared with the yield produced by other varieties grown elsewhere (Nathoo, 2003).

The study was aimed at evaluating the yield performance of three cauliflower varieties, compared with the predominant variety 'Tropical Extra Early', with the objective of identifying a variety with higher yield performance to replace the low-yielding local variety under open field conditions.

## Materials and methods

The experiment was conducted from March to September 2005 and 2006 under field conditions at the Vegetable Evaluation and Research Station Farm at Anse Boileau, Seychelles. Table 1 provides the meteorological information of the trial site at Anse Boileau, Seychelles, for the growth period from March to September 2005 and 2006. The average monthly temperature over the years ranged from 22.2 to 30.2 $^0$C. The average relative humidity ranged between 80.1 and 86.0 per cent. The maximum temperature and relative humidity range were considered high for cauliflower. Booij (2001) reported that maximum temperature above 30 $^0$C and humidity (over 80%) enhance the reduction in cauliflower yield.

Generally, rainfall recorded was low during the crop growth period, while June recorded the highest amount of rainfall and highest number of rainy days.

Total N value in the soil, over the years, was low (0.05 and 0.09%). Similarly, the soil had a medium level of P (7.1 and 9.2 ppm) with a corresponding low level of K (0.07 and 0.10%) for 2005 and 2006, respectively. Relatively moderate amounts of exchangeable bases (Ca and Mg) were present in all the soil units. Over the years, organic matter was low (1.4 and 1.6%), while the *p*H in water was near neutral (Table 2).

Three cauliflower varieties, 'Amazing', 'Clima' and 'Rami', were evaluated alongside the popular variety 'Tropical Extra Early' for yield performance. 'Amazing', 'Clima' and 'Rami' originated from Holland, while the standard variety 'Tropical Extra Early' came from Taiwan. The varieties constituted the treatments, which were laid out in a randomized complete block design with five replications.

Seeds of the varieties were sown in early March in polypots containing a sterilized substrate that comprised the mixture of top soil, well-decomposed cattle manure, and coconut coir in the ratio 3:2:1. One seed per variety was sown in a hole to a depth of 1 cm in each polypot. Nursery care such as handpicking of weeds and hardening to produce sturdy seedlings were administered.

The experimental area (144 $m^2$), which consisted of sandy soil, was cleared, rotovated and divided into 20 treatment plots. Each plot was 3.0 m long and 1.2 m wide. The plot consisted of three rows in which six seedlings per row were transplanted 4 weeks after nursery sowing, at a spacing of 50 cm × 45 cm, giving a total plant population of 18 plants per plot (50,000 plants $ha^{-1}$ equivalent). Well-decomposed poultry manure was initially applied by broadcasting at the rate of 360 g per plot. The broadcast manure was incorporated into the soil and watered immediately, using drip irrigation. The plants were shaded with coconut leaves as soon as the white curd was observed to prevent them from being exposed to direct sunlight and to avoid blanching. The shade was removed 7 days after transplanting when the seedlings were observed to be vigorous and with a diameter range of 7 to 12 cm.

Four top dressings with mixed fertilizer NPK (12:12:17) at the rate of 62.5:62.5:62.5 kg $ha^{-1}$ were applied, following recommendation by Ripjma (1990), at 3 weeks after seedling transplant and repeated at 3-week intervals. This translated into 20.8 g equivalent of the fertilizer applied to each plot. The fertilizer was applied about 10 cm away

TABLE 1

*Meteorological Information, Anse Boileau, Seychelles (March-September) 2005, 2006*

| *Month* | *Mean monthly rainfall (mm)* | *Mean monthly temperature ($^0$C)* | | *Mean relative humidity (%)* |
|---|---|---|---|---|
| *2005* | | *Max.* | *Min.* | |
| March | 7.5(16)$^+$ | 30.0 | 23.0 | 85.0 |
| April | 7.8(18) | 30.0 | 23.3 | 85.2 |
| May | 8.0(23) | 30.2 | 23.2 | 86.0 |
| June | 15.8(25) | 30.2 | 23.1 | 85.8 |
| July | 4.2(12) | 28.0 | 22.6 | 83.6 |
| August | 3.9(12) | 28.5 | 22.4 | 83.5 |
| September | 5.1(16) | 29.4 | 23.0 | 80.1 |
| *2006* | | | | |
| March | 9.3(19)$^+$ | 28.0 | 23.2 | 84.2 |
| April | 9.6(20) | 28.2 | 23.4 | 85.0 |
| May | 10.2(22) | 29.2 | 23.2 | 85.2 |
| June | 15.3(24) | 28.3 | 23.1 | 83.4 |
| July | 4.0(11) | 28.4 | 22.8 | 80.1 |
| August | 3.6(17) | 27.5 | 22.2 | 81.4 |
| September | 3.8(10) | 26.6 | 22.3 | 81.2 |

Source: Vegetable Evaluation and Research Meteorological Station, Anse Boileau, Seychelles
$^+$Values in parenthesis indicate number of rainy days

TABLE 2

*Physico-chemical Properties of the Soil of Experimental Site, in 2005 and 2006*

| | *Soil analytical data* | | |
|---|---|---|---|
| *Parameter* | *2005* | *2006* | *Method of analysis* |
| Organic matter | 1.4% | 1.6% | Walkley-Black method |
| Nitrogen | 0.05% | 0.09% | Kjeldahl method |
| $P_2O_5$ | 7.1 ppm | 9.2 ppm | Flame photometric |
| K | 0.07% | 0.10% | Oxidation method |
| Ca | 1.89 meq/100% | 2.01 meq/100% | |
| Mg | 1.00 meq/100% | 1.02 meq/100% | |
| *p*H ($H_2O$) | 5.8 | 6.3 | *p*H meter |
| *p*H ($Cacl_2$) | 5.0 | 5.1 | *p*H meter |

Type of soil: Sandy
Source: Soil Science Laboratory, Grand Anse, Seychelles
ppm: parts per million

from the plant stand and placed at a depth of about 5 cm, covered well with soil and watered immediately after each application. The plots were weeded manually as the need arose. Harvesting was in early September when large portions of the leaves were observed to be dry and had dropped.

Yield data taken included mean days to maturity, mean curd length, mean curd width at 3 months after transplant, mean curd circumference, mean curd compactness, mean curd weight, and yield (t $ha^{-1}$). The data were subjected to Analysis of Variance (ANOVA), while the Least Significant Difference (LSD) was used to separate treatment means.

## Results and discussion

Table 3 presents the yield performance of four cauliflower varieties under open field conditions at Anse Boileau, Seychelles, for 2005 and 2006.

Variety 'Tropical Extra Early' was the earliest (97.0 and 98.2 days) to mature for 2005 and 2006, respectively; while 'Rami' matured late (137.3 and 135.8 days) for both years. This could be attributed to its varietal response, because varieties differ in the length of time they may remain at the vegetative stage before curds are initiated and become mature. Similarly, 'Tropical Extra Early' is considered tolerant to harsh weather and could withstand prolonged high temperatures (Delahaut, 2004) as observed during the study period. This could have influenced its early germination and subsequent early maturity.

Variety 'Rami' produced the longest curd and widest curd. However, its curd length and curd width were not significantly different when compared to that produced by a similar late-maturing

TABLE 3

*Yield Performance of Four Cauliflower Varieties at Anse Boileau, Seychelles for 2005 and 2006*

| | *Mean number of days to mature from transplanting (no.)* | | *Mean curd length at 3 MAT (cm)* | | *Mean curd width at 3 MAT (cm)* | | *Mean curd circumference (cm)* | | *Mean curd compactness (g $cm^{-1}$)* | | *Mean curd weight (g)* | | *Mean curd yield (t $ha^{-1}$)* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Variety* | *2005* | *2006* | *2005* | *2006* | *2005* | *2006* | *2005* | *2006* | *2005* | *2006* | *2005* | *2006* | *2005* | *2006* |
| Amazing | 123.8 | 125.0 | 28.2 | 26.9 | 13.4 | 13.8 | 32.1 | 31.3 | 4.0 | 4.0 | 129.2 | 125.0 | 5.1 | 5.5 |
| Clima | 114.0 | 113.9 | 20.5 | 21.4 | 10.5 | 11.0 | 30.2 | 31.2 | 4.1 | 3.9 | 125.1 | 121.3 | 5.3 | 5.2 |
| Rami | 137.3 | 135.8 | 28.3 | 27.7 | 14.4 | 15.0 | 33.9 | 35.4 | 3.9 | 3.6 | 132.3 | 129.0 | 5.9 | 6.0 |
| Tropical Extra Early | 97.0 | 98.2 | 20.3 | 20.0 | 10.4 | 10.8 | 24.5 | 26.3 | 4.6 | 4.1 | 111.7 | 108.2 | 4.0 | 4.2 |
| Means | 118.0 | 118.2 | 24.3 | 24.0 | 12.2 | 12.7 | 30.2 | 31.1 | 4.2 | 3.9 | 124.6 | 120.9 | 5.1 | 5.2 |
| LSD ($P$=0.05) | 10.6 | 8.5 | 5.6 | 4.3 | 2.6 | 2.4 | 1.3 | 2.6 | 0.8 | 0.6 | 3.0 | 2.6 | 0.5 | 0.4 |
| CV (%) | 12.21 | 15.30 | 9.75 | 7.87 | 8.67 | 9.30 | 4.37 | 3.25 | 4.68 | 6.72 | 6.42 | 8.00 | 4.97 | 5.60 |

Curd compactness: ratio of curd weight to curd circumference
MAT: months after transplanting

variety 'Amazing'. This view supports that of Nathoo (2003) who reported that late-maturing varieties produced large curds. The late-maturing variety could have benefited from the prolonged accumulation of thermal units necessary for forming sufficient curd, thus influencing size.

Although curd compactness produced by all varieties was not significantly different, 'Rami' had the highest curd circumference and largest curd weight per plant, besides recording the best yield of 5.9 and 6.0 t $ha^{-1}$ for 2005 and 2006, respectively. Its curd circumference, curd weight, and yield were significantly higher at $P$=0.05 level than those recorded for other varieties. Rughoo & Rajkomar (2001), in a similar experiment in India, reported that 'Rami' produced the best yield compared to five other varieties introduced. 'Rami' significantly improved yield by 32.2 and 30.0 per cent in 2005 and 2006, respectively, compared to the yield from the popular 'Tropical Extra Early'.

## Conclusion

'Rami' is the preferred variety, which is associated with higher curd length, curd width, curd circumference, curd weight and yield, respectively. It is recommended that further investigation on the yield performance of the varieties be evaluated across different locations with varied ecology in Seychelles.

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