
SEASONAL VARIATION OF GROWTH AND YIELD PERFORMANCE OF MUSTARD (*Brassica juncea* (L.) Czern & Coss) GENOTYPES IN SRI LANKA

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ABSTRACT

Seasonal variations affect growth and yield of a crop, primarily by changing its phenological developmental processes. A study was conducted to establish the relationship between growth, yield and their seasonal variations using ten mustard accessions (AC 501, 515, 580, 790, 1099, 1814, 2122, 5088, 7788 and 8831). The field study was conducted in a site at Nagollagama in Kurunegala District during two growing seasons, Maha and Yala. There was a significant variation in agronomic and phenological characters in different mustard accessions between two seasons, Maha and Yala, and among the accessions ($p \leq 0.05$). Plant growth was affected by variations in climatic conditions. Soil moisture was unlimited and comparatively steady in Maha, but significantly fluctuated during Yala. Difference in soil nutrients, temperature and relative humidity during two seasons also contributed the variation in plant growth. Significantly high yields were obtained from all mustard accessions during the Maha season. There is a substantial variability of yield potential in different mustard genotypes in studied. Three mustard accessions (AC 580, AC 5088 and AC 7788) produced significantly higher yield in Maha and AC 7788 produced highest yield in Yala season as well, showing adaptability to seasonal variations.

Key words: Growth, Maha and Yala seasons, mustard accessions, yield, phenological development

INTRODUCTION

The genus *Brassica*, one of 51 genera in the family Brassicaceae is the most economically important genus within the family, containing 37 different species. Many crop species are included in the genus *Brassica*, which provide edible roots, leaves, stems, buds, flowers and seeds. Mustard (*Brassica juncea* (L.) Czern & Coss) has been grown in the Indian subcontinent for over a hundred years as an oil seed crop. However, in Sri Lanka mustard is grown in lesser extents compared to other crops in the drier areas.

Sri Lanka has a collection of over 60 accessions of *B. juncea* in the gene bank of the Plant Genetic Resources Centre, Gannoruwa (PGRC Catalogue, 1999). These accessions have undergone natural selection for desirable characters such as tolerance to drought and resistance to pests and diseases.

However, genetic diversity and the relationships among these local mustard accessions as well as their yield potential as a crop plant is yet to be studied in detail (Weerakoon *et al.*, 2008). A preliminary study was conducted to assess the genetic

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divergence of local mustard (*B. juncea* (L.) Czern & Coss) genotypes using numerical systematic analyses of agronomic and phenological characters (Weerakoon *et al.*, 2007) and molecular markers (Weerakoon *et al.*, 2008) for characterization and identification of genetically diverse and agronomically superior accessions. These findings, suggest that there is a wide genetic variation among local mustards.

Mustard has remained as a subsidiary crop in the dry and intermediate zones of Sri Lanka. Farmers cultivate mustard in Sri Lanka with low inputs (Andrahennadi *et al.*, 1991). It is broadcast sown and harvested in four months. It is mainly cultivated in Badulla, Puttalam, Anuradhapura, Rathnapura, Nuwara Eliya, Kurunegala and Matale districts. However, no studies have been undertaken to estimate the yield potential of those cultivated mustards and of the other available local mustard accessions as well as the effect of seasonal variation on the yield of mustard in Sri Lanka.

It is well known that the yield of a crop depends on the prevailing climatic condition of a particular area. Seasonal variation in temperature is an important climatic factor which can have profound effects on the growth and yield of crops (Kalra *et al.*, 2008). Changes in seasonal temperature affect the grain yield, mainly through phenological development processes. Climate change is of great concern at present, and there is a growing interest in understanding its impact on growth and yield of crops, and also identifying suitable management options to sustain the crops' productivity under the climate change scenario (Kalra *et al.*, 2003).

Being an island, Sri Lanka does not have its own circulation patterns and the climate of the island is mainly depending on global circulation patterns. Thus, changes in the global circulation pattern make an impact

on the eco-climatic conditions and the yield of crops grown in the island. The vulnerability of Sri Lankan natural vegetation and behavior of eco-climatic zones under changing climate has already been considered (Somaratne and Dhanapala, 1996; Ratnasiri, 2000; Somaratne *et al.*, 2003). According to those studies, Sri Lanka cannot be excluded from the countries which are vulnerable to changing climatic conditions. Therefore studying the relationship between mustard growth, yield and climatic conditions is a key issue at field trial levels in selecting local mustard accessions suitable for extensive cultivation in Sri Lanka.

Sri Lanka has a total area of 65,610 km². The dry and intermediate zones occupy 2/3 of the total area, mustard cultivation is practiced in these areas. Therefore, it is important to conduct studies on the relationship between seasonal changes prevailing in these areas and the yield of crops including mustard, in order to select some genotypes for recommending to farmers for extensive cultivation.

The purpose of this study was to evaluate the impact of seasonal variation on growth and yield of local mustard accessions (*Brassica juncea* (L.) Czern & Coss) and to identify prospective mustard genotypes to cultivate in Sri Lanka

MATERIALS AND METHODS

A total of ten mustard accessions (AC 501, 515, 580, 790, 1099, 1814, 2122, 5088, 7788 and 8831) were selected based on their diverse agronomic and phenological characters, which were estimated in a preliminary study to assess the genetic divergence of local mustards using numerical analysis (Weerakoon *et al.*, 2007). The present study was conducted over two seasons, Yala (April to September -receives South Western

showers) and Maha (October to March - receives North Eastern showers) in the intermediate zone at Nagollagama, Maho in Kurunegala District during October 2007-September 2008. A total of thirty four agronomic and phenological characters, four climatic parameters and seven soil physical and chemical properties were taken into consideration in the present study.

There were ten replicates for each mustard accession and planted in a blocks having an area of 10 m². Collected data were analyzed using One way Analysis of Variance (ANOVA) and mean comparison made with Duncan's Multiple Range Test (DNMRT) and the statistical significance level was set at $p \leq 0.05$. All analyses were done with the SAS 9.1 (SAS, 1996) software (SAS Institute Inc., Cary, NC). A total of 34 agro-morphological characters were subjected to cluster analysis.

The Euclidian distances between the pairs of mustard accessions were calculated and clustering of accessions was based on the Un-weighted Paired Group Method with Arithmetic mean (UPGMA) (Sneath and Sokal, 1973). The result of the cluster analysis was presented in a dendrogram.

Agronomic and phenological characters

The agronomic and phonological characters were selected according to Rabbani *et al.* (1998). The selected characters were coded (Table 1)

Climatic Parameters

The study site was located in Nagollagama, Maho which falls within the Intermediate Zone of the country. The nearest meteorological station to the site was placed at Kurunegala and the meteorological parameters of the site such as mean annual temperature, mean annual rainfall and relative humidity were obtained from the Meteorological Department, Colombo, Sri Lanka. The mean annual values of temperature, rainfall and relative humidity for the years 2007 and 2009 for the site were 27.4 °C and 27.3 °C; 1618.4 mm and 2400.6 mm respectively. The relative humidity values of the year 2007 and 2008 were 70% D and 83% N; 72% D and 86% N respectively.

Table 01. The codes and agronomic and phenological characters measured on each mustard accession during the study.

Character code	Agronomic and phenological character
Seedling stage	
CH1	Cotyledon petiole length (cm) ^A
CH2	Cotyledon length (cm) ^A
CH3	Cotyledons width (cm) ^A
CH4	Cotyledons width/length ratio ^A
CH5	Hypocotyl length (cm) ^A
CH6	Anthocyanin coloration of hypocotyl ^A
CH7	Leaf blade shape ^A
CH8	Lobation of leaf margins ^A
CH9	Number of leaflets ^A
CH10	Number of serrates ^A
CH11	Leaf petiole length (cm) ^A
CH12	Leaf length (cm) ^A
CH13	Leaf width (cm) ^A
CH14	Leaf length/width (ratio) ^A
Flowering stage	
CH15	Days to bolting initiation ^P
CH16	Days to first flowering ^P
CH17	Days from bolting initiation to first flowering ^P
CH18	Days from first to last flowering ^P
CH19	Leaf petiole length (cm) ^A
CH20	Leaf length (cm) ^A
CH21	Leaf width (cm) ^A
CH22	Leaf length/ width ratio ^A
Maturity stage	
CH23	Days to maturity ^P
CH24	Number of developed leaves on the main stem ^A
CH25	Plant height (cm) ^A
CH26	Number of primary branches/plant ^A
CH27	Length of main inflorescence (cm) ^A
CH28	Silques/main inflorescence ^A
CH29	Silique length (mm) ^A
CH30	Siliques width (mm) ^A
CH31	Silique length/width ratio (mm) ^A
CH32	Number of seeds/silique ^A
CH33	1000-seed weight(g) ^A
CH34	Seed yield/plant(g) ^A

A: Agronomic characters

P: Phenological characters

Soil Properties

A total of ten soil samples were collected at 10 cm depths in each season from the site at random and composited into one sample. Three composite soil samples were taken before planting in each season and the soil was crushed by hand to pass a 2 mm sieve. The following soil properties were measured on the collected samples.

1. Physical properties

- a) Soil dry bulk density (DBD)
- b) Soil total porosity
- c) percentage water filled pore space (% WFPS)

Dry bulk density (DBD) was calculated from the oven dried soil weight divided by the internal volume of PVC tubes (Anderson and Ingram, 1993). The DBD was used to calculate soil total porosity with the assumed density of solids for most mineral soils of 2.65 g cm^{-3} , according to Anderson and Ingram, (1993). The percentage water filled pore space (% WFPS) of the soil samples was calculated according to Linn and Doran (1984) and Tate (2000).

2. Chemical properties

- a) Soil pH,
- b) Total carbon and nitrogen contents,
- c) Macronutrients and
- d) Heavy Metals (Mn, Co, Pb and Zn).

Soil pH was measured in accordance with the method proposed by Anderson and

Ingram (1993). Soil total carbon and nitrogen contents were also measured according to Anderson and Ingram (1993). Soil macronutrients were extracted using the modified Bray and Morgan soil test extractants (McIntosh, 1969) and measured using standardized atomic absorption spectrometer (AAS) and expressed in $\mu\text{g g}^{-1}$ oven dried soil weight.

Available heavy metals in soil were extracted using Ammonium Bicarbonate-Diethylene Triamine Penta Acetic Acid as a multinutrient extractant (ABDTPA) (Soltanpour and Schwab, 1977). These soil extracts were used to measure heavy metal contents using AAS (Lindsay and Norvell, 1978). Soil heavy metal concentrations were expressed in $\mu\text{g g}^{-1}$ oven dried soil weight for Mn, Co, Pb and Zn.

Results

The variations of the characters CH 1 to CH 10 across different mustard accessions were not statistically significant ($p \leq 0.05$). The comparison of the mean value of CH 16 across the accessions revealed that there were significant differences ($p \leq 0.05$) except for AC 1099 and AC 5088 (Table 2). Similarly, variation of CH 23 across the accessions was significantly different except for the subset of AC 580, 5080 and AC 1814, 8831. Further, variation of the CH 25, CH 26 and CH 34 led to form subsets of accessions 2 (AC 515, 5088 and AC 790, 7788), 3 (AC 515, 790, 580; AC 2122, 8831 and AC 501, 1814) and 2 (AC 580, 5088 and AC 790, 8831) respectively.

Table 02. Summary of the selected agronomic and phenological characters of ten mustard accessions showing their statistical significance between the accessions for each character (pooled data), (Mean follows Standard Deviations within parenthesis). Character code: CH 16-Days to 1st flowering, CH 23-Days to maturity, CH 25-Plant height at maturity (cm), CH 26-No. of primary branches, CH 34-Seed yield/plant (g).

Mustard Accessions	CH 16	CH 23	CH 25	CH 26	CH 34
AC 501	66.60(2.69) ^c	108.65 (3.06) ^h	90.43 (40.05) ^h	4.50(2.27) ^{cd}	9.50 (0.16) ^c
AC 515	77.65(2.83) ^a	135.50 (4.50) ^a	128.04 (189.90) ^c	6.00(2.31) ^b	7.80 (0.15) ^e
AC 580	69.90 (3.34) ^b	124.40 (4.57) ^b	155.69 (78.77) ^a	6.50 (2.31) ^{ab}	10.75 (0.17) ^b
AC 790	64.40 (3.24) ^{de}	110.90 (5.42) ^g	118.62 (65.24) ^e	6.00 (1.98) ^b	8.60 (2.34) ^d
AC 1099	65.90 (2.33) ^{cd}	112.20 (12.39) ^f	153.75(36.15) ^b	5.60 (2.25) ^{bc}	6.70 (0.14) ^f
AC 1814	56.00(54.5) ^f	116.50 (115.10) ^d	126.45 (12.54) ^d	4.60 (4.60) ^{cd}	4.50 (0.59) ^g
AC 2122	76.90(3.40) ^a	114.60 (13.43) ^e	106.47 (34.24) ^f	3.40(2.62) ^d	9.10 (0.14) ^{cd}
AC 5088	65.95 (6.30) ^{cd}	124.20 (4.91) ^b	127.91(18.87) ^c	5.90 (2.35) ^b	11.15 (0.14) ^b
AC 7788	69.25(4.07) ^b	123.35 (8.38) ^c	118.23 (22.36) ^e	7.50 (1.16) ^a	12.20 (0.16) ^a
AC 8831	63.70(5.93) ^e	117.15 (4.27) ^d	97.45 (46.95) ^g	3.70 (2.17) ^d	8.70 (1.27) ^d

The same letters indicate that there is no significant different at $p \leq 0.05$.

The summary of the cluster analysis indicated that mustard accessions included in the study were split into three (03) main clusters at 70% phenon level (Figure 1) The AC 7788 and AC 2122) formed a cluster which was well-separated from the rest of the accessions. AC 501 formed a unique cluster. The rest clustered together.

The selected agronomic and phenological characters measured in Maha and Yala are summarized in Table 3. The comparison of the characters, days to first flowering (CH 16), days to maturity (CH 23), plant height at maturity (CH 25), number of primary branches on the main stem (CH

26) and average seed yield /plant (CH 34) across different seasons revealed that there was a significant variation in agronomic and phenological characters between the seasons Maha and Yala among the accessions ($p \leq 0.05$). The average yield/plant is an indicator of agronomic preference and the relationship depicted in Figure 2 clearly shows that there is a discernible variation in the yield of different mustard accessions during two seasons. In addition, mustard accession AC 7788 had the highest yield in Maha and Yala followed by AC 5088 and AC 580. The seed yield is always higher in all accessions in Maha season compared to Yala season ($p \leq 0.05$).

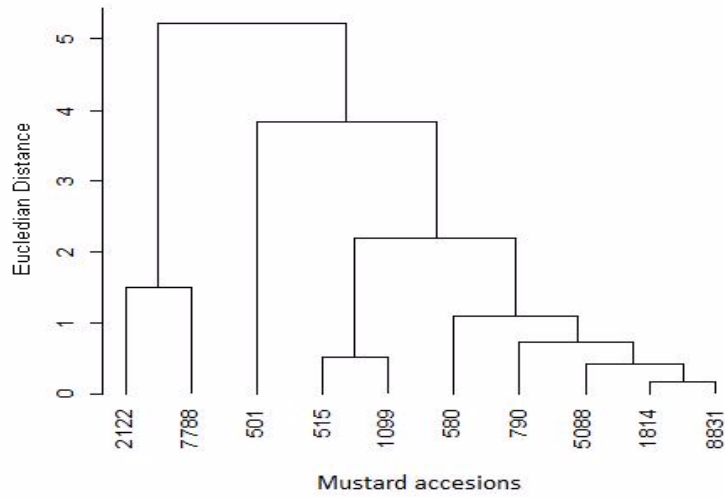


Figure 01. Dendrogram constructed by the cluster analysis of ten mustard accessions on thirty four agronomic and phenological characters (Euclidian distances (1-5) represent 1-100% phenon levels).

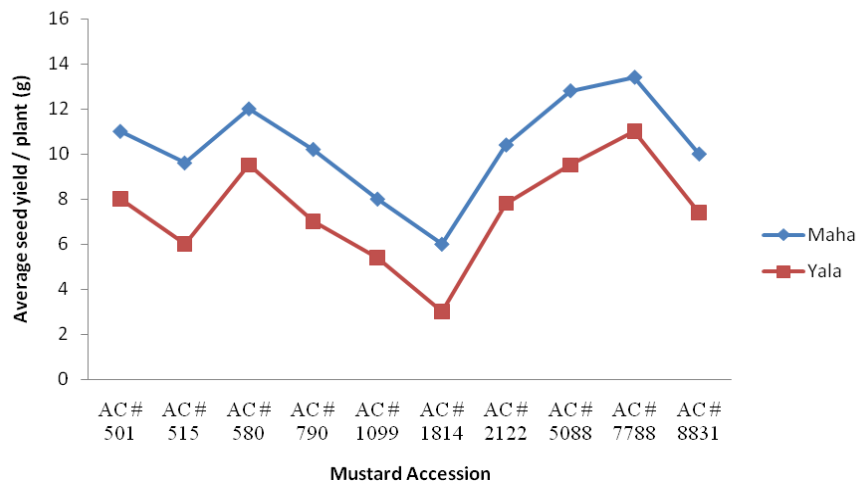


Figure 02. The relationships between yield (average seed yield/plant (g)) of ten mustard accessions in Maha and Yala seasons.

Table 03. Summary of the agronomic and phenological characters measured during Maha and Yala season for the selected mustard accessions used in the study. (Mean follows Standard Deviations within parenthesis). Character code: CH 16-Days to 1st flowering, CH 23-Days to maturity, CH 25-Plant height at maturity (cm), CH 26-No. of primary branches, CH 34-Seed yield/plant (g).

Acc. No.	CH 16		CH23		CH 25		CH 26		CH 34	
	Maha	Yala	Maha	Yala	Maha	Yala	Maha	Yala	Maha	Yala
AC # 501	64.4 (1.25)a	68.8 (1.20)b	107.2 (1.40)a	110.1 (1.00)b	918.6 (17.00)a	890.0 (17.66)b	6.6 (0.40)a	2.4 (0.40)b	11.0 (0.04)a	8.0 (0.32)b
AC # 515	76.2 (1.32)a	79.1 (1.30)b	134.0 (2.00)a	137.0 (2.12)b	1295.8 (89.80)a	1265.0 (89.00)b	8.0 (0.45)a	4.0 (0.45)b	9.6 (0.50)a	6.0 (0.51)b
AC # 580	68.8 (1.56)a	71.0 (1.55)b	122.8(2.15)a	126.0 (2.16)b	1571.0 (36.00)a	1542.8 (36.70)b	8.0 (0.45)a	5.0 (0.50)b	12.0 (0.32)a	9.5 (0.30)b
AC # 790	62.4 (1.54)a	66.4 (1.60)a	109.4(2.80)a	112.4 (2.85)b	1200.4 (22.54)a	1172.0 (23.00)b	8.0 (0.40)a	4.0 (0.45)b	10.2 (0.35)a	7.0 (0.37)b
AC # 1099	64.6 (1.08)a	67.2 (1.00)b	110.4(5.87)a	114.0 (5.87)b	1550.1 (15.50)a	1524.8 (15.65)b	7.8 (0.37)a	3.4 (0.35)b	8.0 (0.45)a	5.4 (0.45)b
AC # 1814	54.0 (2.30)a	58.0 (2.00)b	114.6(2.90)a	118.4 (2.98)b	1279.0 (10.77)a	1250.0 (10.00)b	6.6 (0.25)a	2.6 (0.30)b	6.0 (0.32)a	3.0 (0.30)b
AC # 2122	74.8 (1.96)a	79.0 (1.96)b	113.2(3.11)a	116.0 (3.00)b	1079.2 (17.00)a	1050.2 (17.87)b	4.8 (0.35)a	2.0 (0.37)b	10.4 (0.51)a	7.8 (0.50)b
AC # 5088	64.4 (2.98)a	67.5 (2.90)b	122.4(2.30)a	126.0 (2.32)b	1294.0 (5.58)a	1264.2 (6.00)b	6.8 (0.49)a	4.8 (0.45)b	12.8 (0.60)a	9.5 (0.58)b
AC # 7788	68.6 (1.91)a	69.9 (2.00)a	122.2 (3.97)a	124.5 (3.90)a	1190.0 (7.90)a	1174.6(7.97)b	3.6 (0.40)a	6.0 (0.20)b	13.4 (0.93)a	11.0 (0.90)b
AC # 8831	61.6 (2.80)a	65.8 (2.80)b	115.8 (2.01)a	118.5 (2.00)b	989.0 (20.00)a	960.0 (21.00)b	5.4 (0.25)a	2.0 (0.25)b	10.0 (0.30)a	7.4 (0.25)b

The same letters indicate that there is no significant different at $p \leq 0.05$.

The soil physical parameter, soil moisture is varying considerably between the two seasons ($p \leq 0.05$) (Table 4). The soil organic carbon (SOC) and C: N ratio obtained for the two seasons showed a statistically significant difference (Table 4). The higher SOC contents were occurred during the Maha season and lower contents were found during the Yala season. This SOC difference was possibly due to the

temporal variation in climatic and soil physical parameters which were measured for the seasons. Comparison of soil macronutrient contents of Maha season with that of Yala revealed that there was significant difference in each nutrient (Table 5 and Figure 3 (A)). Similarly, the amounts of soil heavy metal content, except Co and Pb are significantly vary between the Maha season and the Yala season (Table 5 and Figure 3 (B)).

Table 04. Soil physico-chemical properties measured for Maha and Yala seasons at the study site (Mean follows the Standard Deviations within parenthesis).

Season	Soil moisture	Soil Bulk density	% water filled pore space	Soil pH	Total soil carbon %	Total Nitrogen %	C:N ratio
Maha	20.08 (0.72) a	1.42 (0.03) a	24.49 (1.07) a	6.50 (0.19) a	4.46 (0.22)a	0.23 (0.01) a	19.54 (0.90)a
Yala	16.23 (0.68) b	1.42 (0.03) a	24.49 (1.07) a	6.75 (0.15) a	4.04 (0.20)b	0.23 (0.01) a	17.74 (0.86)b

The same letters indicate that there is no significant different at $p \leq 0.05$.

Table 05. Soil macronutrient and soil heavy metal contents (in $\mu\text{g g}^{-1}$) oven dried soil weight) of the site during Maha and Yala seasons (mean follows the Standard Deviations within parenthesis).

Season	Total inorganic N	NH₄⁺	NO₃⁻	PO₄³⁻	SO₄²⁻	Ca⁺	Mg²⁺	K⁺
Macro-nutrients								
Maha	14.24 (1.65) a	13.55 (1.61) a	0.69 (0.12) a	10.36 (1.53) a	4.95 (0.50) a	206.21 (20.53)a	345.43 (15.34) a	490.06 (40.32) a
Yala	10.58 (1.11) b	9.68 (1.04) b	0.56 (0.11) b	7.95 (0.92) b	3.63 (0.43) b	185.88 (18.52)b	332.97 (13.90) b	404.04 (31.54) b
Heavy metals								
	Cu	Mn	Co	Pb	Zn	Fe		
Maha	5.21(0.18)a	0.95 (0.12) a	0.18 (0.05) a	0.11 (0.01) a	7.00 (0.39) a	1.84 (0.09) a		
Yala	3.86 (0.23)b	0.70 (0.07) b	0.15 (0.04) a	0.11 (0.01) a	6.03 (0.35) b	1.44 (0.09) b		

The same letters indicate that there is no significant different at $p \leq 0.05$.

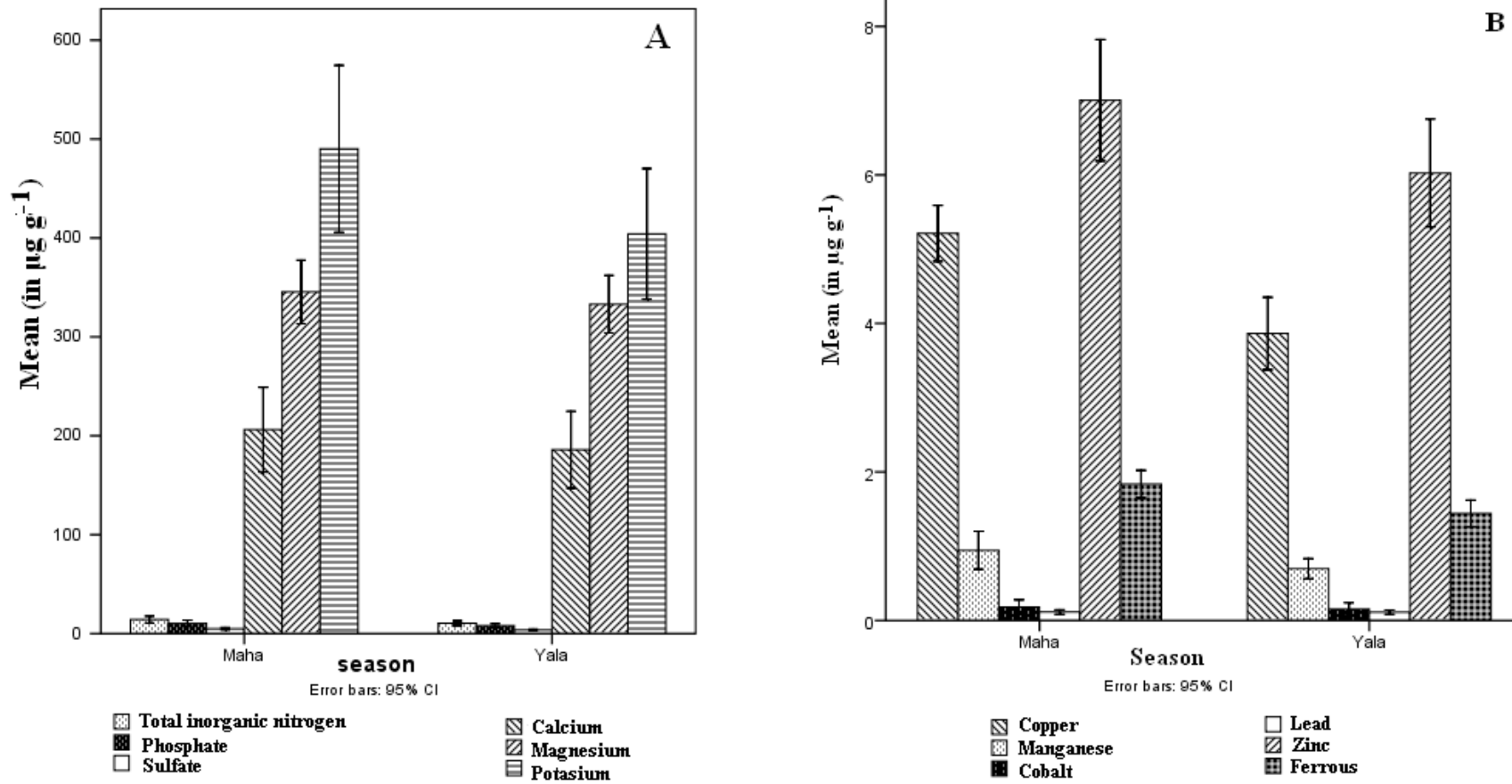


Figure 03. The variation of soil nutrients: A. macronutrient and B. soil heavy metal contents of the site during Maha and Yala seasons

Discussion

The climatic conditions vary with respect to the changes in the atmospheric conditions and it has been found that global climatic conditions are changing rapidly due to anthropogenic activities (Gitay *et al.*, 2001). Therefore, there is an unprecedented increase in global temperatures and the change in rainfall patterns leading to soil moisture fluctuations. In addition, there are evidences that these climatic changes cause considerable reduction in crop yield (Tompkins *et al.*, 2005). Therefore, there is a growing concern on the relationship between yield of crop plants and climatic conditions (Sivakumar *et al.*, 2005; Kalra *et al.* 2003). Recent studies have shown that yield of most of the mustard varieties throughout the world has decreased with increasing temperature. Although *B. juncea* showed tolerance to high temperature and water deficit in low rainfall areas in Western Australia, the yield potential was low due to high temperature (Si and Walton, 2004). Another study by Kalra *et al.* (2003) clearly indicated that the yield of mustard shows signs of stagnation or decrease following the rise in temperatures in four northern states in India. According to Srinivastava and Balkrishna (2003), the phenological development pattern of mustard regulates its yield and the former is regulated by environmental variables. Adaptation of genotypes of mustard to a range of environments can best be explained by their phenotypic stability (Gunasekera *et al.*, 2006).

Agronomic characters of selected mustard accessions varied with seasons except for CH1 to CH10. The narrow variation of characters CH1 to CH10 among the local mustard accessions has contributed less in the characterization of mustard genotypes (Somaratne *et al.*, 2007). During Maha, there was no limitation in soil moisture due to abundant rainfall and comparatively lower temperature. However, soil moisture varied considerably during Maha and Yala

seasons. The present study showed that most of the growth parameters, as well as yield parameter varied between Yala and Maha. Fluctuation of soil nutrient contents during Maha and Yala may be one of the factors that contribute to the variation in growth parameters and the yield of mustard accessions. Variations in soil nutrients could be directly or indirectly related to depletion of SOC and increase in the C: N ratio. A study conducted by Srinivastava and Balkrishna (2003) to investigate the environmental parameters influencing phenological development of Indian mustard in relation to yield indicated that the late sowing of mustard retarded yield by adversely altering their reproductive growth. Late sowing of mustard subjected the crop to a low rainfall, higher temperature and low relative humidity in the atmosphere. Similarly in this study, Yala season with low rainfall, high temperature and low relative humidity than Maha season had affected the phenological development pattern of mustard which regulates its yields. Higher yields were observed in Maha and lower yield in Yala for all mustard accessions. Although mustard has been reported to be drought resistant (Si and Walton, 2004), change in temperature has a profound effect on mustard yield (Kalra *et al.*, 2008).

In general, higher yields are observed for Maha season and lower yield occurred in Yala season. The past twelve years (1997-2008) statistics have shown that mustard yield in Maha seasons are 4-5 times more than the yield in Yala seasons (AESD-Sri Lanka, 2008). Mustard accessions such as AC 580 and AC 5088 produced a higher yield during Maha season and the accession AC 7788 produced comparatively higher yields during both Maha and Yala seasons. All mustard accessions except AC 7788 produced a comparatively lesser yield during Yala season. AC 7788 demonstrated less sensitivity to environmental changes by adapting to different seasons, as it gave

less variability in seed yield during Maha and Yala. Hence, this genotype has shown a better phenotypic stability than other mustard accessions. The result of the cluster analysis has also confirmed that AC 7788 is different from other accessions (except AC 2122) in terms of agronomic and phenological characters. According to Gunasekera *et al.* (2006) adaptation of genotypes of mustard to changing environments can best be explained by their phenotypic stability. Similarly, in consistent with Gunasekera *et al.* (2006), AC 7788 is indicating adaptations to changing climatic conditions showing better phenotypic stability.

Although better yields are indicated by the mustard accessions under laboratory conditions (Weerakoon *et al.*, 2007), this study indicates that there is a variation in yield parameters with respect to different mustard accessions and the seasons during which the crop is cultivated. Certain

accessions showed a better yield performance during field trials under the two seasons. This study considered only two climatic seasons, however, in order to have a better understanding on the yield performances of local mustards available in Sri Lanka, more field trials are required to be conducted for a considerable period of time to cover the variation in the climate and to confirm present findings.

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