OPENING MINDS:
RESEARCH FOR SUSTAINABLE
DEVELOPMENT

Evaluation of Growth and Yield Performance of Selected Lines of Yard Long Bean (*Vigna unguiculata* sub spp. *Sesquipedalis*) during Off Season in Mid Country Wet Zone

T.W.G.F.A. Nijamdeen[1], P.K.J.de Mel*[1] and P. Malathy[2]

[1]*Department of Agricultural and Plantation Engineering, Open University of Sri Lanka, Nugegoda, Sri Lanka*

[2]*Hortcultural Crop Research and Development Institute, Gannoruwa, Sri Lanka*

**Corresponding author: Email: pkmel@ou.ac.lk*

1 INTRODUCTION

Yard Long Bean (*Vigna unguiculata* sub spp. *sesquipedalis*) belongs to the family Fabaceae is a widely cultivated vegetable crop throughout the subtropical and tropical countries including Sri Lanka. Immature Yard long bean pods are one of the very low calorie vegetables containing large quantities of fiber, protein, vitamin C and A. They also contain minerals such as iron, copper, manganese, calcium, and magnesium (USDA nutrient data base, 2009).

Yala and *Maha* are the two major cultivating seasons of Sri Lanka when the climatic conditions are favorable for crop growth and production. However vegetables including Yard long bean are cultivated to a lesser extent between these two major seasons. During this season the climatic conditions are said to be adverse for vegetable cultivation due to high temperature and low rain fall. Therefore, this season has been identified as a less suitable season for vegetable cultivation which is referred to as the off seasonal cultivation (Department of Agriculture, 1994). Most often during this season, the Yard long bean cultivation fields lie abandoned. This results in a decreased income for farming families. At the same time the consumers have to pay higher prices for Yard long bean due to the low supply in the market. Increase in temperature and water stress during the off season results in poor growth and final pod yield in Yard long bean. Cultivation of appropriate varieties during off season is one of the best strategies to overcome the above problems. Therefore, the present study was conducted with the objective of identifying suitable Yard long bean varieties for off seasonal cultivation in the mid country, wet zone of Sri Lanka.

2 METHODOLOGY

The experiment was carried out by planting six locally developed varieties of Yard long bean, variety 32-5, variety32 – 14, variety Hordi Kola, variety Hordi Red, variety Gannoruwa A9 and variety Gannoruwa Hawari in 18 plots in 2 rows system in the field belonging to the Horticultural Crop Research and Development Institute (HORDI), Gannoruwa in the mid country wet zone during February to May 2016. Each plot consisted of 40 plants. The evaluation was carried out in a Randomized Complete

Block Design (RCBD) with 3 replicates. All cultural practices from land preparation to harvesting was carried out as recommended by the Department of Agriculture (DOA). Germination percentage one week after planting, total number of leaves per plant, internodes length (cm), leaf area (cm^2) and Chlorophyll content were used as growth parameters to evaluate growth performance of different varieties. Fresh weight of pods (g) after harvest was recorded to calculate the final yield and then evaluate the yield performance of different varieties. In this study fifteen harvests were taken. The data collected were analyzed by using Minitab 17 statistical package.

3 RESULTS AND DISCUSSION

The present investigation focused on the evaluation of six Yard long bean varieties for their growth and yield performance in the off seasonal cultivation.

3.1 Seed germination percentage

Table 1: Seed germination percentage

Variety	Seeds germination %
32-5	91.67[a]
32-14	80.83[a]
Hordi Kola	84.17[a]
Hordi Red	68.75[a]
Gannoruwa A9	88.33[a]
Gaannoruwa Hawai	80.00[a]

Drought has negative effects on yard long bean production (Burton, 1997). Therefore the drought conditions in the off seasonal cultivation play an important role in seed germination. In this study, the highest seed germination rate was recorded in the variety 32-5 (91.67%) while the lowest seed germination rate was observed in the variety Hordi Red (68.7%). No significant difference in seed germination was noted among varieties (Table 1).

Means that do not share a letter are significantly different by the LSD at p=0.05

3.3 Leaf Area

Leaf area is critical for crop light interception and thereby has an influence on crop yield (Sinclair, 1983). Leaf area is an important component of growth. (Potter et al., 1977). In this study a significant difference was observed in leaf area among the varieties except the varieties 32-5 and Hordi kola (Table 2). The highest leaf area was observed in Hordi red (150.48 cm2) while the lowest leaf area was recorded in the variety Gannoruwa hawari (93.86 cm2).

Table 2: Variation in leaf area in different varieties

Variety	Leaf Area (cm^2)
32-5	126.39[c]
32-14	112.97[d]
Hordi Kola	130.70[c]
Hordi Red	150.48[a]
Gannoruwa A9	139.70[b]
Gaannoruwa Hawai	93.86[e]

3.2 Total number of leaves

Total number of leaves plays an important role in growth and yield of plants. The highest total number of leaves in all varieties was achieved in the fifth week after planting (Figure 1).

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The highest total number of leaves was recorded in the variety, Hordi Kola. After six weeks of planting a gradual decrease in the total number of leaves was observed in all varieties. In the seventh week after planting, the variety Gannoruwa hawari showed more defoliation than the other varieties. In the ninth week after planting the highest total number of leaves was recorded by the variety Hordi Red (25.0) while the lowest was recorded by the variety Gannoruwa hawari (7.41). All other varieties did not show any significant difference.

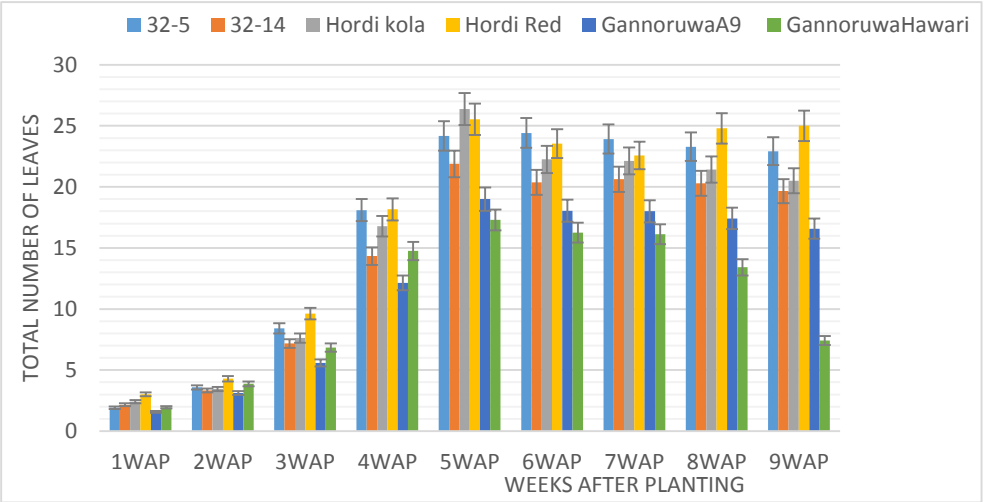

Figure 1: Variation in number of leaves with time (weeks after planting – WAP)

3.3 Internode length

Table 3: Variation in the internodes length with time (weeks after planting – WAP)

Variety	2WAP	4WAP	6WAP	8WAP	10WAP
32-5	14.12^{b}	15.83^{b}	15.9^{b}	16.12^{b}	16.16^{b}
32-14	16.0^{ab}	23.58^{a}	23.5^{a}	24.04^{a}	24.04^{a}
Hordi kola	16.66^{ab}	18.45^{ab}	18.45^{ab}	18.50^{ab}	18.58^{ab}
Gannoruwa A9	22.16^{a}	21.29^{ab}	21.63^{ab}	22.68^{ab}	22.68^{ab}
Gannoruwa Hawari	18.42^{ab}	18.25^{ab}	18.66^{ab}	18.70^{ab}	18.54^{ab}

Internodes length plays an important role in growth of plants. It influences the shoot length depending on growth conditions when it is formed, and shortly thereafter (Quinlan and Weaver, 1970). In this study after the second week of planting the highest internode length was recorded in the variety Gannoruwa A9 (22.16 cm) while the lowest was recorded in the variety 32-5 (14.12 cm). The other varieties did not show any significant differences. Four weeks after planting the highest internodes length was recorded in the variety 32-14 (23.58 cm) while the lowest was recorded in the variety 32-5(15.83 cm) (Table 3).

3.4 Chlorophyll content

Healthy plants with large amounts of chlorophyll are expected to have

maximum growth compared with unhealthy ones (Campbell and Reece, 2005). Further Hesketh *et al.*, (1981) demonstrated a positive correlation between leaf photosynthesis rate and chlorophyll content. In this study after the second week of planting, the highest chlorophyll content was recorded in variety 32-5 (54.02 cm^2) while the lowest was recorded in the variety, Gannoruwa hawari (46.67 cm^2). In the fourth and sixth week after planting there was an increase in chlorophyll content of all varieties. At the eighth week all varieties showed a high rate of chlorophyll content and the highest rate recorded in the variety Hordi red (74.61 cm^2) and the lowest in the variety Gannoruwa hawari (61.76 cm^2). There was no significant difference in the chlorophyll content among varieties (Table 4).

Table 4: Variation in Chlorophyll content with time (weeks after planting – WAP)

Variety	2WAP	4WAP	6WAP	8WAP	10WAP
32-5	54.05^{a}	56.13^{a}	58.06^{abc}	69.93^{a}	56.22^{abc}
32-14	53.45^{ab}	56.07^{a}	58.43^{ab}	67.96^{a}	58.74^{ab}
Hordi kola	49.56^{abc}	54.26^{ab}	55.77^{abc}	68.34^{a}	56.71^{abc}
Hordi Red	53.92^{ab}	56.08^{a}	62.45^{a}	74.61^{a}	60.36^{a}
Gannoruwa A9	48.73^{bc}	51.75^{b}	53.54^{bc}	66.04^{a}	53.61^{bc}
GannoruwaHawari	46.67^{c}	53.30^{ab}	50.65^{c}	61.76^{a}	51.93^{c}

3.5 Total yield

Total yield plays an important role in determining the overall performance of the crop in off seasonal cultivation. The total yield ranged from 19012 g/ha to 6252 g/ha. The highest total yield of the trial was recorded in the variety Hordi red (19012 g/ha) while the lowest was recorded by variety Gannoruwa hawari (6252 g/ha).The other varieties did not show a significant difference (Figure 2).

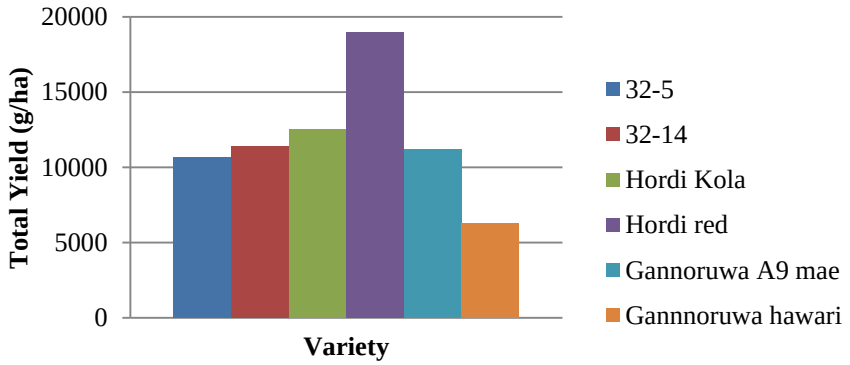

Figure 2: Variation in total yield in different varieties.

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4 CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that the Hordi Red is the most suitable variety for off seasonal cultivation in the mid country wet zone since it provides higher yield. Some of the varieties, variety 32- 5, Hordi Kola and Gannoruwa A9 showed interesting characteristics such as the highest germination percentage, highest total number of leaves after the fifth week of planting and the highest internode length after two weeks of planting respectively which can be further improved for off seasonal cultivation. It is recommended testing these results at least for two consecutive seasons before using these varieties in the farmer's fields.

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