ACCEPTABILITY AND NUTRITIONAL EVALUATION OF HYACINTH BEAN GENOTYPES [*Lablab purpureaus* (L.) Sweet]

By

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THESIS

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DECLARATION

I hereby declare that this thesis entitled **Acceptability and nutritional evaluation of hyacinth bean genotypes** [*Lablab purpureus* **(L) Sweet)** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree diploma fellowship or other similar title of any other University or Society

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VANISREE KATHI

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Dedicated To

SRI SHIRDI SAI BABA &
MY FAMILY

Introduction

INTRODUCTION

India has made a commendable progress in vegetable production securing the position of second largest vegetable producer in the world next to China But the consumption of vegetables is only 210 g/capita/day against the minimum requirement of 285 g/capita/day for a balanced diet (Chaurasia and De 2001)

Vegetables play an important role in human diet as an important source of protective foods They are rich sources of essential nutrients viz vitamin C provitamin A and folate Green vegetables provide substantial quantities of iron calcium and provitamin A Furthermore vegetables provide many nutritionally less defined yet important components of our diet like fibres and antioxidants Epidemiological evidence suggests that populations whose diets are rich in fruits and vegetables have a reduced risk of degenerative diseases such as coronary heart disease and cancer

Vegetable production and productivity must be increased to meet the present inadequate supply and to keep pace with the rising population for nutritional security The search for novel high quality but inexpensive sources of nutrients should be a major concern of all agencies involved in providing adequate food and improving the nutritional status of the population of the developing countries (Longvah 2000) Commercialization of under exploited vegetables will help in solving this problem to a certain extent (Dhankhar 2001)

Hyacinth bean can produce large quantity of fresh beans per unit area providing supplemental quality protein along with vitamins and minerals to a rice based diet (Nath 1986)

Systematic study on the nutritive value and acceptability of the hyacinth bean genotypes has not been done in our state Hence the present study on the nutritional evaluation and acceptability of hyacinth bean genotypes will be of great help to identify genotypes with high nutritional qualities and suitability as a vegetable inorder to achieve a major break through in the genetic improvement of hyacinth bean

Hence the present study entitled Acceptability and nutritional evaluation of hyacinth bean genotypes was conducted with the following objectives

1 To study the nutritional composition of the pods of hyacinth bean genotypes

2 To evaluate the acceptability of the pods of hyacinth bean genotypes

Review of Literature

2 REVIEW OF LITERATURE

2.1 Importance of vegetables in our diet

The main purpose of vegetables in human diet is that they embellish the existing diet with nutrients enrich the staple main food make it more palatable and improve the digestion and sometimes they have a curative action (Indira and Peter 1988) Vegetables other than green leafy vegetables and roots and tubers not only add variety to the diet but also provide vitamin C and minerals (Gopalan *et al* 1989)

Vegetables form an important component of the Indian dietary in which they are normally prepared and consumed in the form of different types of curries as traditionally formulated in various regions of the country They are also important as components of the rations for troops in forward areas and on boardships and submarines (Jayaraman *et al* 1991)

Manay and Swamy (1995) opined that the intake of the vegetables has been too low in our daily diet because we are not able to appreciate the vast potential of vegetables in our diet and therefore continue to depend too much on cereals When compared to the consumption rates of developed countries India is on an average consume only about 120 g of vegetables per day (Ram *et al* 1997)

Vegetables play a pivotal role in our health security which is endangered by the low intake of protective foods Among protective foods vegetables are excellent sources of roughage carbohydrates protein vitamins and minerals like calcium and iron (Dutt 1996 and Ramesh *et al* 1997)

Vegetarıanısm ıs mushroomıng all over the world now It has been gıven an offıcıal approval ın the Amerıcan Government s revısed Dıetary Guıdelınes for Amerıcans (Sheth 1997) Vegetarıanısm not only reduces the food costs but also lower blood cholesterol non ınsulın dependent dıabetes and l as lower rısk of develop ng some of the ser ous scourges of mankınd l ke atherosclerosıs dıvertıcular dısturbances of colon haemorrhoıds gall stones and even constıpatıon and obesıty (Kanwar *et al* 1997)

Mudambı and Rao (1985) reported that the calorıe content of the vegetables per 100 gram varıes from 40 80 kılo calorıes dependıng on the carbohydrate content Accordıng to Passmore and Eastwood (1986) the value of vegetables as a source of energy ıs very small Most of vegetables provıde from 10 15 kılo calorıes per 100 g The large bulk of vegetables helps to promote satıety and thıs wıth theır low energy value makes them useful ın the preventıon and treatment of obesıty

Legumınous vegetables are ımportant sources of dıetary prote ns (Nowackı 1980)

The fat content of vegetables other than green leafy vegetables and roots and tubers ıs negl g ble (Mudambı and Rao 1985)

Accordıng to Passmore and Eastwood (1986) the chıef nutrıtıve value of vegetables ıs as a supply of β carotene ascorbıc acıd and folate

Cashel and Lewıs (1990) reported that one component of vegetables dıetary fibre has got wıde attentıon It has been descrıbed as a protectıve agent agaınst many of the present day dıseases of affluence

The fibre content of most vegetable fell within the narrow range of 1 4 per cent (Jones *et al* 1990)

The main micronutrients present in vegetables showing strong anti carcinogenic effect include pro vitamin A vitamin C vitamin E and selenium They also act as strong anti oxidants and are involved in DNA and cell maintenance and repair They specifically protect DNA and cell membrane against oxidative damage by carcinogens like free O_2 radicles methyl groups and hydroxyl groups So the consumption of vegetables had a decreased risk of cardiovascular diseases diabetes and cancer due to the presence of some anti carcinogenic agents (Ames *et al* 1993 and Bertram 1996)

Some anti carcinogenic compounds found in cruciferous vegetables protect against cancer by inhibiting enzymes that activate carcinogens and by inducing detoxifying agents (Verhoeven *et al* 1996)

Until recently most attention has been paid to vitamins such as vita nin C provitamin A and dietary fiber in vegetables but in recent years it has been shown that plant tissues contain a whole variety of potentially anti carcinogenic secondary metabolites (Singh and Kalloo 1998 and Savery *et al* 1999)

Vegetables also play a key role in neutralizing the acids produced during digestion of proteins and fatty foods and also provide roughage in the form of dietary fiber which helps in digestion and bowel movement (Chakrabarthi 2001)

Fruits and vegetables provide substantial amount of nutrients important for human health They are particularly important sources of micro nutrients such as provitamin A vitamin B_6 vitamin C vitamin E folic acid iron and magnesium Increasing the consumption of micro nutrient rich fruits and vegetables will improve micronutrient status and reduce the risk of deficiencies (Singh and Kalloo 2001)

Vegetables are primary dietary source of essential nutrients viz vitamin C and β carotene folate and minerals Further more vegetables provide many nutritionally less defined yet important components of our diet eg fibres and antioxidants (De 2001)

Vegetables among protective foods are rich sources of essential elements besides having medicinal and therapeutic properties and able to provide nutritional security to a predominantly vegetarian country like India (Verma 2001)

2 2 Nutritional significance of under exploited vegetables

There is an ever increasing gap between food supplies and population growth particularly in the developing countries The search for novel high quality but inexpensive sources of nutrients continue to be a major concern of all agencies involved in providing adequate food and improving the nutritional status of the population of the developing countries Available data on less familiar plant foods suggest that they are comparable or even superior in some instances to normally cultivated crops (Longvah 2000)

As the dietary pattern in India is changing day by day people want a change in their food habits along with their way of living In such circumstances a new range of minor vegetables are catching the attention of growers retailers and consumers which are known to be under exploited or rare vegetables the consumption of which is very less due to non preference and ignorance (Chaurasia and De 2001)

Rare vegetables are rich sources of antioxidants which are now a days widely promoted as agents that act as protectants against various disorders of human health viz coronary heart disease and cancer (De 2001)

2 2 1 Under exploited green leafy vegetables

Besides the commonly consumed leafy vegetables in India a great variety of less familiar green leafy vegetables are also used locally in different parts of the country (Saxena 1999)

The young shoots and tender leaves of chaya an under exploited vegetable is reported to be high in protein calcium iron thiamine riboflavin niacin and ascorbic acid (NAS 1975a)

The unconventional leafy vegetables found in the forests and cultivable waste land of Konkan like drumstick leaves math katemath bharangi and kawala contained comparitively higher amounts of crude protein crude fat ash crude fibre and total carbohydrate (Shingade *et al* 1995) According to the authors the unconventional leafy vegetables contain more carbohydrates than conventional sources Drumstick leaves were superior in carbohydrate content (11 5%) when compared to spinach cowpea etc

Mathew (2000) reported that the mean soluble carbohydrate content in some under exploited leafy vegetables varied from 0 63 to 2 12 g/100 g with basella leaves having the lowest and centella leaves with the highest value. According to the author the mean starch content of leafy vegetables ranged between 0.007 per cent and 1.70 per cent, Bengal keera was found to have the highest amount and water leaf the lowest.

Nag and Matai (1991) estimated the amino acid composition of the cytoplasmic fraction of leaf protein from some green leafy vegetables and reported an excellent balance of essential amino acids in leaf proteins. Handique (1993) detected 12 free amino acids including 7 essential amino acids in certain un conventional leafy vegetables. Green leafy vegetables are good sources of protein, and the dry matter of leaves contain protein as much as legumes (Reddy, 1999).

Mathew (2000) analysed the protein content of 8 under exploited green leafy vegetables and revealed that the protein content varied from 1.20 g to 3.13 g/100 g. The highest value was observed in Kangkong and the lowest in basella leaves.

Green leafy vegetables like gogu and fenugreek provided on an average 0.34 g of fat/100 g of leaves and these leaves contained high amount of □-linoleic acid (NIN, 1993). According to Mathew (2000) the fat content of different leafy vegetables ranged from 0.18 per cent in Kangkong to 0.65 per cent in Aksharakeera.

Gupta *et al.* (1989) reported that the tender leaves of colocasia, drumstick, fenugreek and neem are good sources of neutral detergent fibre and acid detergent fibre. Benefits of dietary fibre can be had by increased consumption of green leafy vegetables which also increase the faecal bulk and prevents constipation (Reddy, 1999).

Mathew (2000) analysed the fibre content of the leafy vegetables and reported that it varied from 0.92 per cent to 4.08 per cent. The highest and lowest fibre contents were observed in centella leaves and water leaves respectively.

Chekkurmanis one of the popular green leafy vegetable in South India commonly known as multi-vitamin and multi-mineral packed leafy vegetable is very rich in minerals and vitamins (Ramachandran *et al.*, 1980).

Green leafy vegetables are rich in minerals especially iron, calcium, phosphorus, copper, iodine, sulphur and boron. Cowpea leaves are rich in iron, calcium, phosphorus and zinc (Imugi and Potter, 1983). Drumstick leaves are rich in sulphur, zinc and boron (Chavan *et al.*, 1996).

According to Mathew (2000) the calcium content of different less familiar leafy vegetables ranged from 13.42 mg/100 g in basella to 135.20 mg in bengal keera. Phosphorus ranged from 5.60 mg to 13.84 mg/100 g of leaves. The highest value was obtained in kangkong and the lowest in water leaf. According to the author the mean iron content ranged between 5.16 to 34.76 mg/100 g highest in kangkong and the lowest in basella leaves.

Green leafy vegetables such as colocasia, fenugreek, mustard, mint, coriander and curry leaves are rich and inexpensive sources of ß-carotene (Bressani *et al.*, 1986; Gopalan *et al.*, 1989; NIN, 1993 and Thimmayamma and Pasricha, 1996). Vijayaraghavan (1996) indicated that green leafy vegetables like spinach, drumstick leaves etc. which are affordable by the rural and urban poor are major inexpensive sources of provitamin A. The carotenoid content of dark green leafy vegetables are associated with lower risk of certain epithelial cancers (Reddy, 1999). A study conducted by Kowsalya and Chandrasekhar (1999) indicated that drumstick leaves in it's raw form had maximum total carotene and ß-carotene. Mathew (2000) reported that the ß-carotene content of kangkong leaves was 22147 µg and in centella it was 4007.42 µg.

Green leafy vegetables are rich in vitamin C which is required to keep the gums in healthy condition (Menon, 1980 and Gopalan *et al.*, 1989). According to Manay and Swamy (1995) drumstick leaves were considered useful in scurvy and catarrhal affliction. Spinach, drumstick, mint, coriander etc. are equally good sources of vitamin C as fruits (Thimmayamma and Pasricha, 1996).

As observed by Mathew (2000) the vitamin C content of the leafy vegetables varied from 51.77 mg to 127.27 mg per 100 g highest being in centella and the lowest in Bengalkeera.

Drumstick leaves are rich in tocopherols (Vit. E), estrogenic substances and some enzymes (Gopalan, 1982).

Mathew *et al.* (2000) analysed eight leafy vegetables of Kerala for different nutrients during rainy and summer seasons. Except the β-carotene content of the leaves all the other nutrients varied significantly during summer and rainy seasons. Though no significant variation was observed in the protein, fibre, fat and β-carotene content of leaves between summer and rainy seasons. Significant increase in calcium, phosphorus, iron and vitamin C contents of the leaves were observed during rainy season. The average nutritive value of the leaves was also found to be higher during rainy season.

2.2.2 Under exploited roots and tubers

Cocoyam, taro yam and elephant foot yam are the important minor tuber crops. This group of crops has the potential to produce significantly high amount of food per unit area (NAS, 1975a).

Tropical roots and tubers are categorized as energy rich food crops due to their high starch content, yam having 18-25 per cent and arroid 19-21 per cent (Kay, 1975). According to the authors the starch content in Amorphophallus is reported to be in the range of 4-18 per cent.

Taro starch can be used in baby foods, hypo allergenic foods and as a cereal substitute in diets for victims of coelic disease (NAS, 1975a). It is reported that the immature tuberous roots of winged bean are eaten like potatoes and taste like apple (Martin and Delpin, 1978). The tubers are agreeble in flavour to young and old and can be used as a baby food.

Poulter (1982) reported starch as the major carbohydrate present in the flesh roots which ranged between 21.7-32.1 per cent. Lower concentrations of starch (7.9-10%) has been reported by Ibuki *et al.* (1983).

A protein content of 6.4 per cent in winged bean roots was reported by Norgan *et al.* (1979). Rao and Belavady (1979) reported a high protein content in winged bean tubers with high lysine and methionine values.

The winged bean tubers are reported to be rich in vitamin A, B and minerals like calcium and phosphorus (NAS, 1975).

According to Neeliyara *et al.* (2001) the crude protein content of the winged bean pods found to be 2.9 per cent. The fat content varied from 0.4 per cent to 0.7 per cent and the fibre content varied from 16.8 per cent to 19.4 per cent.

Dietary fibre in white yam has been reported as 16.3 per cent and white yam diets may protect against cancers of the colon and rectum (Dhankhar, 2001).

2.2.3 Under exploited other vegetables

It has been estimated that 100 g of tropical vegetables can provide 40-60 mg of vitamin C, 100 mg folic acid, 4-7 mg iron and more than 200 mg calcium (Dhankhar, 2001).

The stolons of lotus are collected and sold as vegetables. Analysis of fresh stolons by CSIR (1966) gave the following values: water 83.80 g 100^{-1}, crude protein 2.70 g 100^{-1}., fat 0.11 g 100^{-1}, reducing sugars 1.56 g 100^{-1}, sucrose 0.42 g 100^{-1}, starch 9.5 g 100^{-1}, fibre 0.8 g 100^{-1}, ash 1.7 g 100^{-1} and calcium 0.06 mg 100^{-1}. The vitamins reported to be present are (in mg 100^{-1}) thiamine 0.22 mg 100^{-1}, riboflavin 0.06 mg 100^{-1}, niacin 2.2 mg 100^{-1} and ascorbic acid 1.5 mg 100^{-1}.

Fruits of *Solanum torvum* are cooked and eaten as a vegetable. They are considered useful in case of liver and spleen enlargements. Analysis of dried fruits gave the following values - moisture 12.3 g 100^{-1}, protein 8.3 g 100^{-1}, fat 1.7 g 100^{-1}, minerals 5.1 mg 100^{-1}, crude fibre 17.6 g 100^{-1} and other carbohydrates 55 g 100^{-1}. The mineral constituents (mg 100^{-1} material) are calcium 390 mg 100^{-1}, phosphorus 180 mg 100^{-1} and iron 22.2 mg 100^{-1} (ionisable iron 1.5 mg 100^{-1}) and vitamin A 750 IU (CSIR, 1972).

The berries of Manithakkali considered to possess toxic, diuretic and catteharactic properties and useful in heart diseases. They are the remedy for fevers, diarrhoea, ulcers and eye ailments. Fruits contain glucose and fructose (15-20 per cent), vitamin C and carotene. Seeds forming 9.5 per cent of the weight of the fresh fruits contain 17.5 per cent protein on dry weight basis (CSIR, 1972).

Wax gourd popular in Asian tropics contain 4 per cent protein, 3.2 per cent carbohydrate and 0.1 per cent fat (NAS, 1975b). The seeds of bafalogourd, a drought tolerant under exploited vegetable contains about 30 per cent protein and 34 per cent oil (NAS, 1975b).

Okra is a vegetable of high nutritive value grown all over India. The average nutritive value of okra is 3.21 which is higher than tomato, egg plant and most curcurbits except bittergourd (Grubben, 1977; Butani *et al.*, 1978).

According to Arlin (1977) cooked okra pods, give 91 per cent water, 25 KCal of energy, 2 g protein, fat in traces, 5 g carbohydrate, 7.8 mg calcium, 0.4 mg iron, 420 IU vitamin A, 0.1/mg thiamine, 0.15 mg riboflavin, 1.8 mg niacin and 17 mg ascorbic acid per 100 g.

Dhanprakash *et al.* (1993) reported that the seeds of chenopodium species contained 106-142 g/kg protein and 30-62 g/kg fat. The protein content of vegetable cowpea ranged from 2.5-5.94 per cent (Aghora *et al.*, 1994).

Kuriakose (1995) reported that the crude fibre content in *S. torvum (manithakkali)* is 49.68 per cent, carbohydrate 20.11 per cent, moisture 7.44 per cent, ascorbic acid 40.28 mg 100^{-1} and iron content is 4.78 mg 100^{-1} on dry weight basis.

According to Thampi and Indira (2000) the mean moisture content of the thamara venda genotypes varied from 90.16 g 100^{-1} to 92.04 g 100^{-1}, the mean protein content ranged from 14.19 g 100^{-1} to 17.65 g 100^{-1} on dry weight basis. Fat values showed a variation ranging from 12.52 g 100^{-1} to 14.83 g 100^{-1}, fibre content varied from 9.28 g 100^{-1} to 15.17 g 100^{-1}. In case of calcium the values ranged from 926 mg kg^{-1} to 1406 mg kg^{-1}, the mean iron content varied from 10 mg kg^{-1} to 15.8 mg kg^{-1} and vitamin C content ranged from 786.7 mg kg^{-1} to 922.9 mg kg^{-1}.

According to Neliyara *et al.* (2001) the mean values of winged bean are the following moisture, 71.54 g 100^{-1}, protein 2.9 g 100^{-1}, fat 0.62 g 100^{-1}, starch 29.26 g 100^{-1}, fibre 17.28 g 100^{-1}, energy 148.2 Kcal, calcium 201 mg 100^{-1}, iron 0.96 mg 100^{-1} and vitamin C 15.26 mg 100^{-1}.

2.3 Nutritional composition of leguminous vegetables

Legumes are important sources of plant proteins for human consumption especially in the diets of people living in developing countries (Cerny and Addy, 1973, Rao and Sastry, 1991). Green immature legumes contribute ß-carotene and ascorbic acid which are not usually present in mature dry seeds (Cerny and Addy, 1973).

In addition to the major cultivated edible legumes like soybeans, peas and peanuts there are more than 50 minor tropical legumes that have received little scientific attention (NAS, 1975b). According to Aykroyd and Doughty (1982) legumes are good sources of nutrients particularly proteins, calcium, iron, nicotinic acid and thiamine (Chavan *et al.*, 1987). Food legumes have made significant contribution to human diets since ancient times (Bhatty, 1988).

Winged bean is gaining popularity as a tropical vegetable legume because of protein rich pods, seeds, tender leaves, inflorescence and tubers of all which are edible (Claydon, 1975; Ekpenyong and Borchers, 1979).

In winged bean a protein content of 3.2 per cent in immature pods and 8.1 per cent in beans was reported by Norgan *et al.* (1979). According to Neeliyara (1998) the protein content in winged bean varied from 2.7-3.0 per cent.

Faba beans has been established as a protein source for both human and animal consumption (Duke and James, 1981). The protein content ranges from 24 to 32. This values dependent on the type or variety as well as the area in which it is grown (Ensminger, 1981).

According to NIN (1999) the protein content in various leguminous vegetables is, beans 0.4 g, cluster beans 3.2 g, cowpea pods 3.5 g, double beans 8.3 g, field beans 3.8 g and French beans it is 1.7 g/100 g of vegetables.

The immature pods of the five genotypes of winged bean had a fat content ranging from 0.5 to 0.7 per cent with a mean fat content ranging from 0.62 per cent (Neeliyara, 1998).

A wide range of unusual storage dietary fibres are commonly associated with legumes and many of these water soluble polysaccharides, swell to a gel in water (Trowell, 1976). The fibre content in immature pods, seeds and tubers of winged bean ranged from 1.2-2.6 per cent; 5.0-12.5 per cent and 17.0 per cent respectively (NAS, 1975a). Analysis of edible portions of winged bean roots, young pods and beans by Norgan *et al.* (1979) revealed a fibre content of 6.5 per cent in roots 1.6 per cent in immature pods and 1.9 per cent in beans. The fibre content of the winged bean pods was found to vary from 16.2 to 18.2 per cent with significant variations between the different genotypes (Neeliyara, 1998).

NIN (1999) reported the crude fibre content in some leguminous vegetables. The fibre content in beans 0.8 g 100^{-1}, broad beans 2.0 g 100^{-1}, cluster beans 3.2 g 100^{-1}, cowpea pods 2.0 g 100^{-1}, double beans 0.4 g 100^{-1}, field beans 1.8 g 100^{-1} and french beans 1.8 g 100^{-1}. According to Gopalan *et al.* (1989) the total carbohydrate content in beans is 29.8 g 100^{-1}, broad beans 7.2 g 100^{-1}, cluster beans 10.8 g 100^{-1}, cow pea pods 8.1 g 100^{-1}, double beans 12.3 g 100^{-1}, field beans 6.7 g 100^{-1} and french beans it is 4.5 g 100^{-1}.

Immature pods of winged beans, contain 1.3-1.7 mg 100^{-1} of iron and 63-330 mg 100^{-1} of calcium (NAS, 1975a). Iguchi *et al.* (1987) evaluated the mineral content of immature winged bean pods. Mineral values as reported by the authors were calcium (33 mg 100^{-1}) phosphorus (31 mg 100^{-1}) and iron (0.6 mg 100^{-1}). As reported by Neeliyara (1998) calcium content of winged bean ranged from 165.4 to 249.4 mg 100^{-1} with a mean value of 201 mg 100^{-1} and iron 0.56 to 1.41 mg 100^{-1}.

Gopalan *et al.* (1989) reported that the calcium content of beans is 50 mg 100^{-1}, cluster beans 130 mg 100^{-1}, cowpea pods 72 mg 100^{-1}, double beans 40 mg 100^{-1}, field beans 210 mg 100^{-1} and french beans it is 50 mg 100^{-1}.

Gopalan *et al.* (1989) has reported the iron content of various leguminous vegetables. The iron content of beans is 2.6 mg 100^{-1}, broad beans

1.4 mg 100^{-1}, cluster beans 1.08 mg 100^{-1}, cowpea pods 2.5 mg 100^{-1}, double beans 2.3 mg 100^{-1}, field beans 0.83 mg 100^{-1} and in french beans it is 0.61 mg 100^{-1} and the phosphorus content of beans is 160 mg 100^{-1}, broad beans 64 mg 100^{-1}, cluster beans 17 mg 100^{-1}, cowpea pods 59 mg 100^{-1}, double beans 140 mg 100^{-1}, field beans 68 mg 100^{-1} and french beans it is 28 mg 100^{-1}.

The vitamin C content of the immature pods of winged bean was found to be between 14.3 to 17.2 mg 100^{-1} with a mean vitamin C content of 15-26 mg 100^{-1} (Neeliyara, 1998).

According to Gopalan *et al.* (1989) the vitamin C content of different legumes is in beans it is 27 mg 100^{-1}, broad beans 12 mg 100^{-1}, cluster beans 49 mg 100^{-1}, cow pea pods 14 mg 100^{-1}, double beans 22 mg 100^{-1}, field beans 9 mg 100^{-1} and in fresh beans the vitamin C content is 24 mg 100^{-1} of vegetable and the β-carotene content in various vegetables is, in beans the β-carotene content is 34 μg 100^{-1}, broad beans 9 μg 100^{-1}, cluster beans 193 μg 100^{-1}, cowpea pods 564 μg 100^{-1}, field beans 187 μg 100^{-1} and french beans it is 132 μg 100^{-1} of vegetable.

French beans is a nutritive vegetable which supplies protein 1.7 g 100^{-1}, calcium 50.0 mg 100^{-1}, phosphorus 28.0 mg 100^{-1}, iron 1.7 mg 100^{-1}, carotene 132.0 mg 100^{-1}, thiamine 0.08 mg 100^{-1}, riboflavin 0.06 mg 100^{-1} and vitamin C 24.0 mg 100^{-1} of edible pods (Gopalan, 1982).

Singh and Sood (1997) evaluated the proximate composition of french beans and found that they were rich in protein (20.65 g 100^{-1} to 22.75 g 100^{-1}), crude fibre (3.54 g 100^{-1} to 4.23 g 100^{-1}), fat (1.54 g 100^{-1} to 1.63 g 100^{-1}), carbohydrate (57.7 g 100^{-1} to 59.7 g 100^{-1}) and energy (376 k cal to 379 k cal).

Cow pea is a nutritive vegetable which supplies protein 3 5 g 100^{1} calcium 72 0 mg 100 phosphorus 59 0 mg 100 iron 2 5 mg 100^{1} carotene 564 0 mg 100 thiamine 0 07 mg 100^{1} riboflavin 0 09 mg 100 and vitamin C 24 0 mg 100^{1} per 100 g 100^{1} of edible pods (Gopalan 1982)

The proximate composition of cluster bean revealed that the energy content is approximately 2007 Kcal/kg The crude protein content is around 35 per cent but is apparently quite variable Crude fiber 15 0 g 100^{1} calcium 0 35 mg 100^{1} phosphorus 0 51 mg 100^{1} (Nagpal 1971)

According to Augustin *et al* (1981) the nutritional composition of faba bean is moisture 10 6 g 100 energy 350K cal protein 24 8 g 100 fat 1 4 g 100^{1} total carbohydrates 60 4 g 100^{1} crude fibre 7 0 g 100^{1} neutral detergent fiber 14 9 g 100^{1} ash 3 3 g 100^{1} thiamine 0 52 mg 100^{1} riboflavin 0 286 mg 100 niacin 2 52 mg 100^{1} vitamin B_6 0 374 mg 100^{1} β carotene 47 4 μg 100^{1} phosphorus 373 3 mg 100 potassium 1503 1 mg 100^{1} sodium 11 6 mg 100 calcium 97 8 mg 100 magnesium 214 7 mg 100^{1} zinc 2 35 mg 100 copper 0 82 mg 100 and iron 6 66 mg 100^{1}

2 3 1 Nutritional composition of hyacinth bean

Hyacinth bean (*Dolichos lablab* (L) sweet) also known as bonavist bean is cultivated in many tropical and subtropical areas and is an important food in many parts of Asia (Osama *et al* 2002)

Dolichos bean (*Lablab purpureus* (L) Sweet) belongs to the family leguminosae sub family papilinaceae India has been assigned as the place of origin (Ayyangar and Nambiar 1935) It is primarily grown for green pods which are cooked as vegetable like other beans The dry seeds are also used for various vegetable preparations The foliage of the crop provides hay silage and green manure Medicinal uses are also recorded (Smith 1976) *Dolichos lablab* var typicus is a garden type and cultivated for it s soft and edible pods (Bose *et al* 1986)

Hyacinth beans can produce large quantity of fresh beans per unit area producing valuable supplemental quality protein along with vitamins and minerals to a rice based diet (Nath 1986) It also contains moderately well balanced amino acids Young pods of hyacinth bean is an excellent table vegetable green pods contain 86 1 g 100^{1} moisture 6 7 g 100^{1} carbohydrate 3 8 g 100^{1} protein 0 7 g 100^{1} fat 1 8 g 100 fibre 0 9 g 100^{1} minerals 34 mg 100^{1} magnesium 210 mg 100^{1} calcium 68 mg 100^{1} phosphorus 55 4 mg 100^{1} sodium 1 7 mg 100^{1} iron 74 mg 100 potassium 40 mg 100 sulphur 312 I U vitamin A 0 06 mg 100 riboflavin 0 1 mg 100^{1} thiamine 0 7 mg 100^{1} nicotinic acid and 9 mg 100 vitamin C mg 100^{1} of pod (Chakravarthy 1986) Pods and dried seeds of field bean is are of the major sources of protein in the dietary in Southern India (Shivashankar *et al* 1993)

This bean is used both as seen vegetable and as a pure crop It is richer than French bean in it s nutritive values (Khan 1995) Hyacinth bean (*Dolichos lablab*) is one important vegetable belonging to the family leguminosae which is well suited for tropical as well as subtropical conditions (Peter 1998)

A study conducted by Biju (2000) among 44 genotypes of hyacinth beans from different parts of the co intry showed that the crude fibre content of pods at edible maturity ranged from 1 15g 100 to 3 42 g 100 and the crude protein content of pods at vegetable maturity stage ranged between 1 51 g 100 to 2 79 g 100 [1]

2 4 Acceptability studies

Too often vegetables are prepared with loud overtones of duty and virtue but with little intention of providing delight Well prepared vegetables can be the highlight of the meal Their bright colours give a welcome lift to a meal that might otherwise appear to be drab their varied textures add interest to a meal their many shapes afford a means of creating a more attractive plate and their d verse flavours may be used effectively to complement other flavours (Mc Willia ns 1974)

Accordeing to Ranganna (1977) quality is the ultimate criterion of the desirability of any food product to the consumer overall quality depends on quantity nutritional and other hidden attributes and sensory quality of a finished product or it s ingredients is a compromise between many factors one of which is a high level of sensory appeal

Sensory quality of the food is the consumers reaction to the physical and chemical const tuents of the food in it s prepared and formulated form Sensory evaluation is the ma n technique for evaluating consumer acceptance a id preference relative mportance of sensory attributes in relation to food type for the consumer consumer response to non sensory characteristics in relation to quality of food and changes in consumer food preferences (Govindarajan 1979)

Baghrust (1990) foresees that changes in consumer demand and in food supply and marketing will undoubtedly occur in coming decades Health conciousness in the general community and the food industry is increasing food choice is often stated to be influenced by price convenience tastiness healthfulness and freshness

According to Stone and Sidel (1993) sensory evaluation helps in ensuring that the consumer gets consistent non defective and enjoyable foods For consumers the perceivable sensory attributes like colour appearance feel aroma taste and texture are the deciding factors in food acceptance (Pal *et al* 1995)

Okra which appears bright green firm free of blemishes and no longer than three inches likely will be enjoyable to eat but very young pods tend to taste greasy (Woodroof and Shelor 1958) According to Royall and Lipton (1972) Pods upto 5 inches can be satisfactory however they may be more fibrous than desirable

A comparison between analytical and taste panel evaluation of banana quality showed that sugar/acid ratio and T S S content were highly correlated with flavour and sweetness (Choon and Cho 1972) According to Scow *et al* (1972) it is the alcohol insoluble solid content of bananas which is highly correlated with sensory assessments of texture but T S S and moisture contents were poorly correlated with texture and juiceness assessments

The wınged bean ıs most commonly used as a green vegetable harvested when the pods are about half grown The tender leaves flowers seeds and tubers as well can be co ısumed (NAS 1975a)

Im nature pods wl ch can be eaten raw are hıgl ly palatıble taste lıke green beans and seem to be readıly accepted even by those who have not prevıously eaten them (NAS 1975a)

Pool (1984) evaluated five dwarf banana for fresh market productıon ın Puerto Rıco All rıpe fruıts were classed as acceptable or hıghly acceptable by taste

Accordıng to Iremıren *et al* (1991) the pods of thamaravenda harvested seven days after pod set were of poorer qualıty maınly due to an ıncrease ın crude fibre and reductıon ın moısture crude proteın and ash contents

The acceptabılıty of the edıble parts of the five genotypes of wınged bean was evaluated Neelıyara 1998) The overall acceptabılıty of dıfferent plant parts ındıcated that there ıs no sıgnıficant varıat on ın the qualıty attrıbutes among the five genotypes selected for the study

Thampı (1998) evaluated the cookıng qualıtıes of thamaravenda genotypes ın comparıson wıth the okra varıety The values showed that thamaravenda genotypes generally had a hıgher acceptabılıty level tha ı the Pı sa Sawanı

The acceptabılıty of dıfferent banana varıetıes were evaluated by preparıng thoran (Thajuddeen 2000) When overall acceptabılıty was consıdered for thoran the scores ranged from 5 86 to 7 62 wıth Monthan and Kachıkela havıng the lowest and hıghest score respectıvely

Organoleptıc evaluatıon of fruıts of pumpkın revealed that ın general tl e sensory attrıbutes lıke colour flavour texture and overall appearance was nfluenced by neıther the mıturıty stage ı or source of nutrıtıon ı varıet es Co l and Suvarna (Veena 2001)

Materials and Methods

3 MATERIALS AND MLTHODS

Experimental materi l

1 Selection of genotypes

Out of the 44 hyacu tl bea genotypes maintained by the Departme t of Oleiicult ue College of Hoiticultie Vellanikkaia five high yielding genotypes were selected for the st idy

Selected genotypes

1 DL 40

? DL 44

3 DL 48

4 DL 50

5 DL 6 1

2 Vegetative ch r cters of hy cinth be n genotypes

The follow ng vegetat ve characters are observed (Plates 1 5)

1 Leaf shape

Leaf shape of five hyacinth bean genotypes were obseived

? Le f s ze

Tl e size of the le f of five hy cinth bean genotypes were observed nd noted

3 Flower colour

The flowe coloi r of five hyacintl bea ge iotypes was observed

Plate 1. Fully grown plant of the hyacinth bean genotype DL-40

Plate 2. Fully grown plant of the hyacinth bean genotype DL-44

Plate 3. Fully grown plant of the hyacinth bean genotype DL-48

Plate 4. Fully grown plant of the hyacinth bean genotype DL-50

Plate 5. Fully grown plant of the hyacinth bean genotype DL-6-1

3. Performance of duration of hyacinth bean genotypes

1. Days to 1st flowering

The number of days was counted from sowing to the opening of first flower.

2. Days to 50 per cent flowering

The number of days from sowing to the appearance of flowers in 50 per cent of the plants was recorded.

3. Days to first harvest

The number of days from sowing to the data of first harvest of the fruits at vegetable maturity was noted.

4. Duration of crop (days)

The number of days was counted from the date of sowing to the date of final harvest.

5. Days to vegetable maturity

The days taken from flower opening to the vegetable maturity of the pod in each plant was recorded.

4. Yield and pod characters of hyacinth bean genotypes

1. Pod shape

The shape of the pods was observed (Plates 6-10).

2. Pod colour

The colour of the pods of the five genotypes were observed.

Plate 6. Pod characteristics of hyacinth bean genotype DL-40

Plate 7. Pod characteristics of hyacinth bean genotype DL-44

Plate 8. Pod characteristics of hyacinth bean genotype DL-48

Plate 9. Pod characteristics of hyacinth bean genotype DL-50

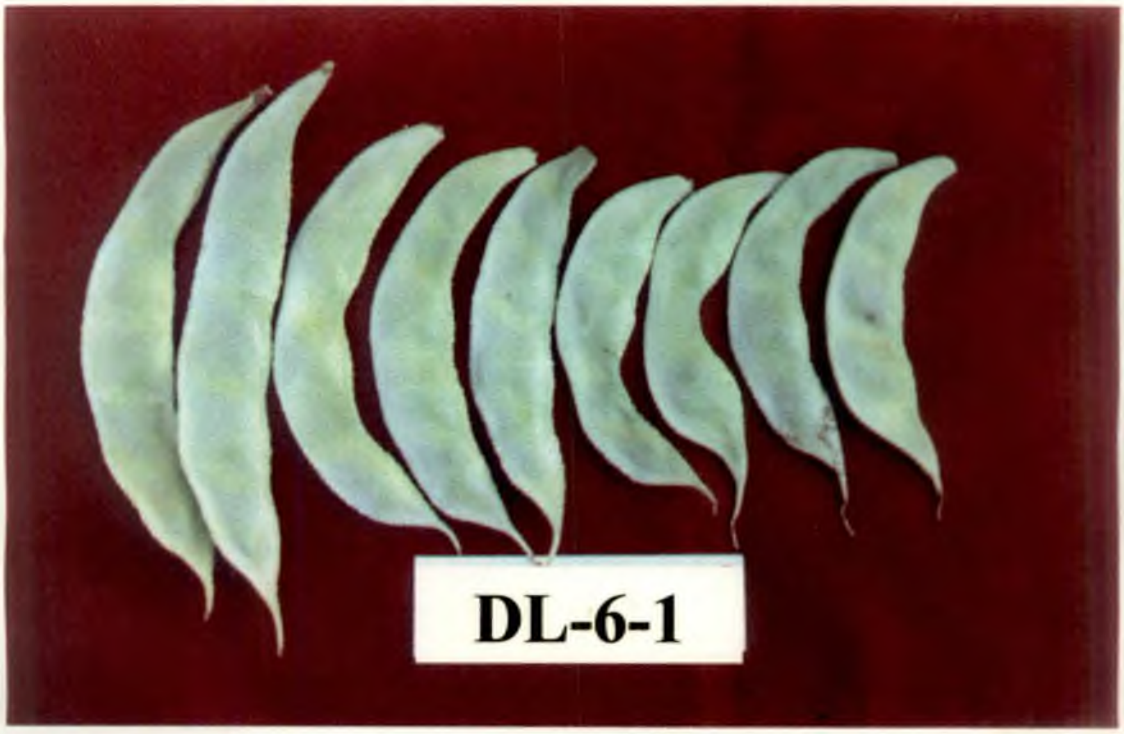


Plate 10. Pod characteristics of hyacinth bean genotype DL-6-1

3. Pod length (cm)

Length of 20 randomly selected pods at vegetable maturity from each observational plant was measured and average recorded in centimeters.

4. Girth of pod (cm)

The same pods used for length measurements were used for recording pod girth also. The girth of twenty pods were measured with the help of twine and the average recorded in centimeters.

5. Weight of pod (g)

The weight of the same pods were taken in an electronic balance and the average was worked out in gram.

6. Number of pods per plant

The total number of pods produced per plant at the time of harvest were observed.

7. Yield per plant (kg)

Pods were harvested separately from each plant periodically and weighed the pods using a top loading balance.

5. Sample collection

The vegetable maturity of hyacinth beans as suggested by Biju (2000) is considered for the sample collection.

6. Nutrient analysis of hyacinth bean genotypes

The following analysis were carried out

1. Moisture
2. Fibre

3 Protein

4 Starch

5 Vitamin C

6 β carotene

7 Iron

8 Calcium

9 Potassium and

10 Phosphorus

6 1 Moisture

The moisture content was estimated by using the method of AOAC (1980)

To determine the moisture content 50 g of fresh sample was taken in a china dish and dried at 60°C 70°C in a hot air oven Cooled it in a desiccator and weighed The process of heating and cooling was repeated till constant weight was achieved The moisture content of the sample was calculated from the loss in weight during drying The period of drying varied from 2 to 3 hrs

6 2 Fibre

The crude fibre content was estimated by acid alkali digestion method as suggested by Chopra and Kanwar (1978)

Two gram dried and powdered sample was boiled with 200 ml of 1 25 per cent sulphuric acid for 30 minutes It was filtered through a muslin cloth and washed with boiling water and again boiled with 200 ml of 1 25 per cent sodium hydroxide for 30 minutes Repeated the filtration through musl n cloth and washed with Sulphuric acid water and alcohol in a sequential manner Tra isferied the residue to a pre weighed ashing dish The residue was ignited for 30 mini tes n a nuffle fui nace at about 250°C cooled in desiccato ai d weigl ed The fibi e content of the sample was calculated fi om loss in weight on ignition and converted to fresh weight basis

6 3 **Protein**

The nitrogen content was estimated using the method suggested by Fischer (1973) 0 382 g of NH_4Cl was taken in 1 litre distilled water and from that 100 ppm 120 ppm 140 ppm 160 ppm 180 ppm 200 ppm were iead calorimetrically for the preparation of standard graph 0 5 g of sample was digested in concentrated H_2SO_4 for 10 m nutes and added 2 3 ml of H_2O di opw se till the solution became colourless The solution was made upto 100 ml From the working solution 5 ml was taken and 1 ml of 10 per cent sodium silicate followed by 2 ml of 10 per cent NaoH were added and made upto 50 ml 1 6 ml of Nessle s reagent was added and the red colour developed was read at 410 im Standard graph was prepared and estimated the protein content

6 4 **Starch**

The starch content was estimated calorimetrically us ng anthi one reagent as suggested by Sadasivam and Manikam (1992)

The dry powdered sample of 0 1 g was extracted with 80 pei cent ethanol to remove sugars Residue was repeatedly extracted with hot 80 per cent ethanol to remove the sugai s completely The residue was dried ovei a watei bath and added 5 ml water and 6 5 ml 52 per cent perchloric acid and extracted in the cold for 20 minutes Centrifuged the sample and reextracted with fresh perchloric acid The supernatant was pooled and made upto 100 ml Pipetted out 0 1 ml of the supernatant made upto 1 ml with water and added 4 ml of anthrone reagent heated for 8 minutes cooled and read the OD at 630 nm

A standard graph was prepared using serial dilution of standard glucose solution From the standard graph the glucose content of the sample was estimated and converted to fresh weight basis This value was multiplied by a factor of 0 9 to arrive at the starch content

6 5 Vitamin C

The vitamin C content of fresh sample was estimated by the method of AOAC (1955) using 2 6 dichlorophenol indolephenol dye

Five gram of fresh sample was extracted in 4 per cent oxalic acid using a mortar and pestle and made upto 100 ml Five ml of the extract was pipetted out and added 10 ml of 4 per cent oxalic acid and titrated against the dye Ascorbic acid content of fresh sample was calculated from the titre value

6 6 ß carotene

ß carotene content was estimated by the method of AOAC (1970) using water saturated n butanol

One gram of fresh sample was extracted in water saturated n butanol using a mortar and pestle and added 10 ml water saturated n butanol The flask was stoppered tightly Shook well for 1 minute and kept overnight protected from sunlight Decanted the supernatant and read at 435 8 nm ß carotene content of the sample was calculated by multiply ng the O D value with the factor 0 1663?

6 7 Iron

Iron content was estimated using calorimetry method as described by Ranganna (1977)

Sample was prepared by dry ashing of 2 g of dry powdered sample To 1 ml of sample solution 0 5 ml of concentrated H_2SO_4 and 1 ml of potassium persulphate were added The colour developed was read at 480 nm The content of iron was expressed in mg per 100 g of sample

6 8 Calcium

The calcium content was estimated using titration method with EDTA as suggested by Page (1982)

Five ml of diacid extract made upto 100 ml was taken and added 100 ml water 10 drops of hydramylamine 10 drops of triethanolamine and 2 5 ml of NaoH and 10 drops of calcone Then it was titrated with EDTA till the appearance of permanent blue colour It was expressed in mg per 100 g of sample

6 9 Potassium

The potassium content was estimated by using flame photometer as suggested by Page (1982)

The dry powdered 1 g sample was digested in diacid and made upto 100 ml Five ml of sample solution was taken for reading directly in flame photometer

6 10 **Phosphorus**

Jackson (1973) estimated the phosphorus content calorimetrically after preparing a diac d extiact by vandomolybdophosphoric yellow colour method n nitric acid medium

One gram of dry powdered sample was pre digested with 12 ml of 9 4 diacid and volume made upto 100 ml 5 ml of aliquot were pippetted into 50 ml volumetric flask and 5 ml of nitric acid vandate molybdate reagent was added and made upto 50 ml After 10 minutes the Optical Density was read at 470 nm in a spectronic photometer A standard graph was prepared using serial dilution of standard phosphorus solution From the standard graph the phosphorus content of the sample was estimated and converted in to fresh weight basis

7 **Organoleptic evaluation**

Organoleptic evaluation of the fresh pods of the hyacinth bean genotypes was conducted at the laboratory level

7 1 **Selection of judges**

A series of acceptability trials was carried out using simple triangle tests at the laboratory level to select a panel of ten judges between the age group of 18 35 years as suggested by Jellinek (1985)

7 2 **Preparation of the sample for acceptability studies**

The fresh pods (50 g) of each genotype at vegetable maturity were collected washed and cut into small pieces cooked in 50 ml of wate by absorption method in a closed vessel by adding one gram of salt The cooked samples were used for acceptability studies

7 3 **Sensory evaluation**

Tl e sei sory evaluat on was cairied out using a sco e ca d based o ı a five point hedon c scale foı parameters like coloı ı texture doneness flavour and taste The score card developed for the st ıdy ıs presented ın Append x I Evalı atıon of the d sl was carried oı t by ten jı dges

Statistical analysis

Analysıs of data was carrıed out by ı sı ıg statıstıcal technıqı es sı ch as analysıs of vaııance for nı trıent analysıs and Kruskalwallı s one way analys s of vaıiance for acceptabıl ty

Results

4 RESULTS

The results of the study entitled Acceptabılıty and nι tr tıo ıal evaluatıon of hyac nth bean genotypes are presented under the follow ng headıngs

1 Vegetatıve characters of hyacınth bean genotypes
2 Performance of duratıon of hyacınth bean genotypes
3 Yıeld and pod characters of hyacınth bean genotypes
4 Composıtıon of hyacınth bean genotypes
5 Organoleptıc qualıtıes of hyacınth bean genotypes

4 1 Vegetatıve charıcters of hyacınth bean genotypes

The mean vegetatıve characters of selected hyacınth bean genotypes are presented ın Table 1

Table 1 Vegetatıve characters of selected hyacınth bean genotypes

Sl No	Genotype	Leaf shape	Leaf sıze	Flower colour
1	DL 40	Normal	Small	Pι rple
2	DL 44	Normal	Medıum	Lıght vıolet
3	DL 48	Normal	Small	Wh te
4	DL 50	Normal	Medıι m	Whıte
5	DL 6 1	Normal	Medıum	Wh te

4 1 1 Leaf shape

The leaf shape of all selected genotypes ıs normal It was observed that all the 5 genotypes had the nor ıal shape of leaf

4 1 2 Leaf size

Regarding size of the leaf it was observed that the genotypes DL 40 and DL 48 had small leaf size where as the other three genotypes had medium leaf size

4 1 3 Flower colour

With respect to colour of the flower DL 40 had purple coloured flowers and DL 44 had light violet coloured flowers Where as DL 48 DL 50 and DL 6 1 had white coloured flowers

4 2 Performance of duration of hyacinth bean genotypes

The mean performance of duration of the selected hyacinth bean genotypes is presented in Table 2

Table 2 Performance of duration of selected hyacinth bean genotypes

Sl No	Genotype	Days to first flowering	Days to 50% flowering	Days to first harvest	Duration of crop (days)	Days to vegetable maturity
1	DL 40	82	108	166	244	11
2	DL 44	83	113	166	244	11
3	DL 48	92	117	175	254	17
4	DL 50	88	116	170	244	17
5	DL 6 1	82	110	166	254	11
Mean		85 4	112 8	168 6	248	13 4

4 2 1 Days to 1st flowering

Days to first flowering showed that DL 48 has taken maximum days for first flowering (92 days) followed by DL 50 (88 days) and DL 44 (83 days)

DL 40 has taken the mınımum days for first flowerıng (82 days) The mean days to first flowerıng was found to be 85 4 days

4 2 2 Days to 50 per cent flowerıng

Wıth regard to days to 50 per cent flowerıng the number of days was counted to the appearance of flowers n 50 per cent of the plants The maxımun days to 50 per cent flowerıng was recorded ın DL 48 (117 days) followed by DL 50 (116 days) and DL 44 (113 days) whereas the mınımum days for 50 per cent flowerıng was observed ın DL 40 (108 days) The mean days to 50 per cent flowerıng was 112 8 days

4 2 3 Days to first harvest

The number of days from sowıng to the date of first harvest of the pods at vegetable maturıty was noted

It was observed that there was not much dıfference ın the days of harvest of the selected genotypes DL 40 DL 44 and DL 6 1 had same number of days to first harvest (166 days) whereas for DL 48 (175 days) and DL 50 (170 days) had taken more number of days for first harvest The mean days to first harvest was found to be 168 6 days

4 2 4 Duratıon of crop (days)

The number of days was counted from the date of sowıng to the date of final harvest

The duratıon of crop was same for DL 40 DL 44 and DL 50 (244 days) whereas DL 48 and DL 6 1 had shown more duratıon of crop (254 days) The mean duratıon of crop was found to be 248 days

4 2 5 Days to vegetable maturity

The number of days was counted from the date of sowing to the attaining of vegetable maturity

DL 40 DL 44 and DL 6 1 have taken 11 days for attaining vegetable maturity whereas DL 48 and DL 50 took 17 days to attain vegetable maturity The mean days to vegetable maturity was found to be 13 4 days

4 3 Yield and pod characters of hyacinth bean genotypes

Pod characters and yield of the selected hyacinth bean genotypes is presented in Table 3

Table 3 Performance of yield and pod characters of selected hyacinth bean genotypes

Sl No	Genotype	Pod shape	Pod colour	Pod length (cm)	Girth of pod (cm)	Weight of pod (g)	No of pods per plant	Y eld per plant (kg)
1	DL-40	Narrow and slightly curved	Light green with purple border	12 8	3 8	2 5	4215 0	8 43
2	DL-44	Straight	Light green	9 6	4 8	2 1	2043 6	3 93
3	DL-48	Straight	Light green	14 5	3 7	2 5	1467 4	3 19
4	DL 50	Slightly curved	Dark green	11 3	4 3	2 2	1500 0	3 75
5	DL 6 1	Straight	Light green	13 1	5 5	2 8	2191 5	ͻ 07
Mean				12 2	4 4	2 4	2283 5	4 87

4 3 1 Pod shape

The shape of the pod at the vegetable maturity stage was noted The pod shape for DL 40 was narrow and slightly curved and for DL 50 it was slightly curved In the other three genotypes DL 44 DL 48 and DL 6 1 the pods were straight without any curve

4 3 2 Pod colour

The colour of the selected hyacinth bean genotypes was observed DL 40 had a light green coloured pod with purple border DL 50 had dark green coloured pod where as the other 3 genotypes DL 44 DL 48 and DL 6 1 had light green coloured pods

4 3 3 Pod length

Length of 10 randomly selected pods at vegetable maturity from each observational plant was measured

Among all the 5 genotypes DL 48 had the maximum length of the pod (14 5 cm) followed by DL 6 1 (13 1 cm) DL 40 (12 8 cm) and DL 50 (11 3 cm) DL 44 had the minimum pod length (9 6 cm) when compared to the other four genotypes The mean length of the pods was found to be 12 2 cm

4 3 4 Girth of pod

The same pods used for length measurements were used for recording pod girth also The girth of ten pods was measured and the average was recorded in centimeters

The maximum girth was observed in DL 6 1 (5 5 cm) where as the minimum girth was observed in DL 48 (3 7 cm) The other three genotypes possessed 3 8 cm (DL 40) 4 3 cm (DL 50) and 4 8 cm (DL 44) respectively The mean girth of pods was found to be 4 4 cm

4 3 5 Weight of pod

The weight of the same pods was taken in an electronic balance and the average was worked out in gram

The maximum weight was observed in DL 6 1 (2 8 g) followed by two genotypes DL 40 and DL 48 (2 5 g) and the minimum weight was observed in DL 44 (2 1 g) The mean weight of pods was observed to be 2 4 g

4 3 6 Number of pods/plant

The total number of pods produced per plant at the time of harvest was observed

DL 40 was observed to have maximum number of pods (4215 pods/plant) where as DL 48 had the minimum number of pods (1467 4 pods/plant) The mean number of pods per plant was observed to be 2283 5

4 3 7 Pod yield per plant

Pods were harvested separately from each plant periodically and weighed the pods using a top loading balance

The maximum yield per plant (kg) was observed in DL 40 (8 43 kg) followed by DL 6 1 (5 07 kg) In the other three genotypes yield was found to be 3 93 kg (DL 44) 3 75 kg (DL 50) and 3 19 kg (DL 48) The mean yield was found to be 4 87 kg plant

4 4 Composition of hyacinth bean genotypes

4 4 1 Moisture

The moisture content of the five hyacinth bean genotypes in the r vegetable maturity stage is given in Table 4 The results of statistical analysis are also presented in the table

The moisture content of the hyacinth bean genotypes ranged from 84 3 g 100 ^{1} to 89 0 g 100 with a mean value of 86 9 g 100 Statistical analysis revealed that the moisture content of the five hyacinth bean genotypes showed no significant variation The maximum moisture content was found in DL 6 1 and the minimum in DL 40 (Fig 1)

Table 4 Nutritional composition of hyacinth bean genotypes

Sl No	Genotypes	Moisture (g 100)	Fibre (g 100)	Protein (g 100)	Starch (mg 100)	Vitamin C (mg 100)	ß carotene (µg 100)
1	DL-40	84 3 ^{a}	0 5 ^{b}	2 5 ^{c}	28 0 ^{a}	8 00 ^{c}	177 6 ^{b}
2	DL 44	86 3 ^{a}	0 6 ^{b}	3 2 ^{b}	46 0 ^{a}	9 10 ^{b}	180 2 ^{ab}
3	DL 48	88 7	0 5 ^{b}	3 2 ^{b}	37 0 ^{a}	13 17 ^{a}	178 4 ^{b}
4	DL 50	86 3 ^{a}	1 5 ^{a}	3 8 ^{a}	29 0 ^{a}	9 00 ^{b}	186 2 ^{a}
5	DL 6 1	89 0 ^{a}	0 5 ^{b}	4 2 ^{a}	32 0 ^{a}	9 10 ^{b}	185 7 ^{a}
Mean		86 9	0 7	3 4	34 4	9 68	181 6
Level of significance		NS	1%	1%	Ns	1%	1%

Mean values with common letters do not differ significantly

4 4 2 Fibre

The crude fibre content of the pods of the five hyacinth bean genotypes is presented in Table 4 The results of statistical analysis are also presented in the table

Fibre content of the pods ranged from 0 5 per cent to 1 5 per cent with a mean value of 0 7 per cent The maximum fibre content was found in DL 50 which was found to be significantly high when compared to the other genotypes There was no significant variation in the fibre content between the other four genotypes (Fig 2)

Fig. 1. Moisture content of pods of hyacinth bean genotypes

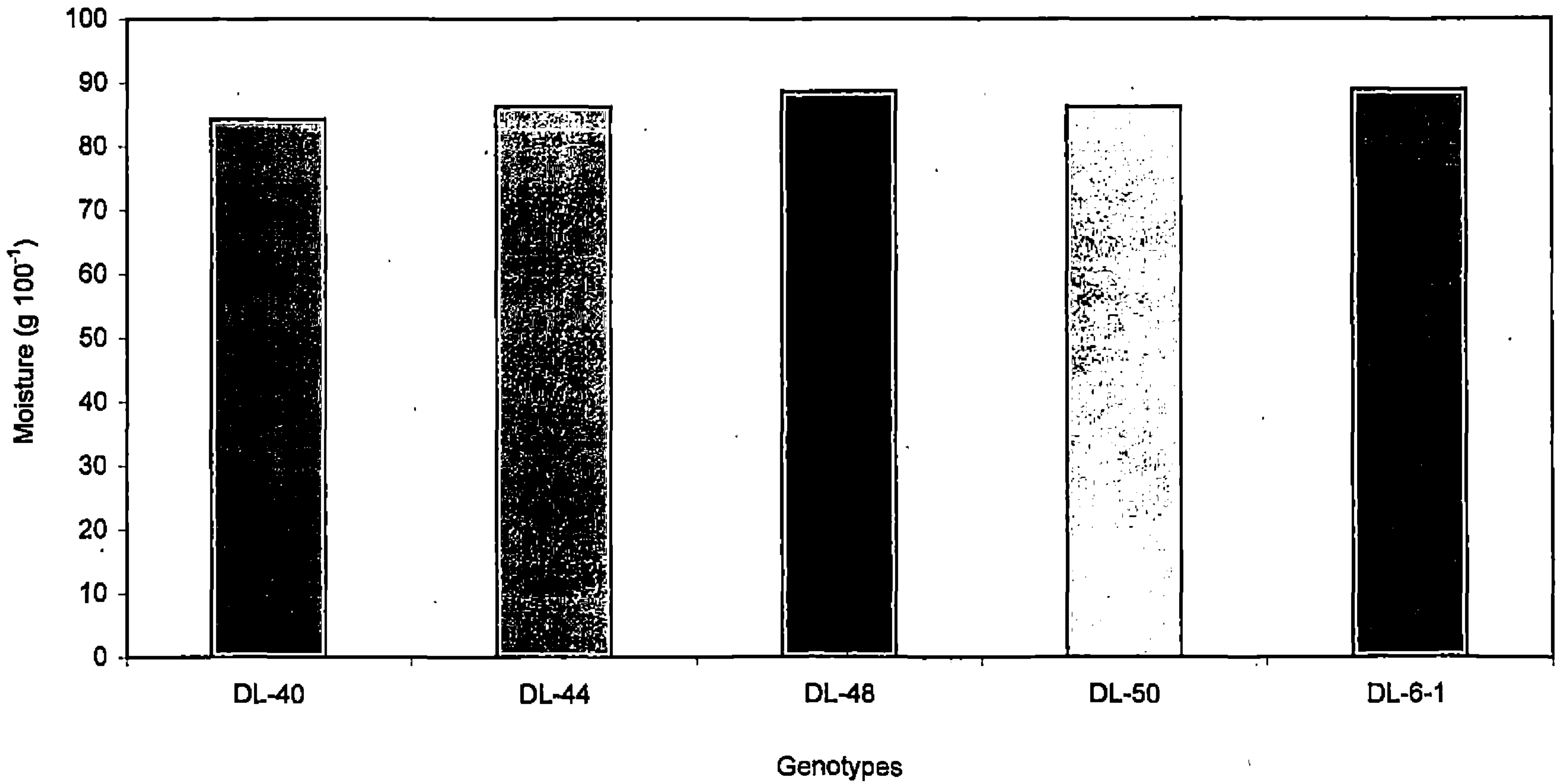
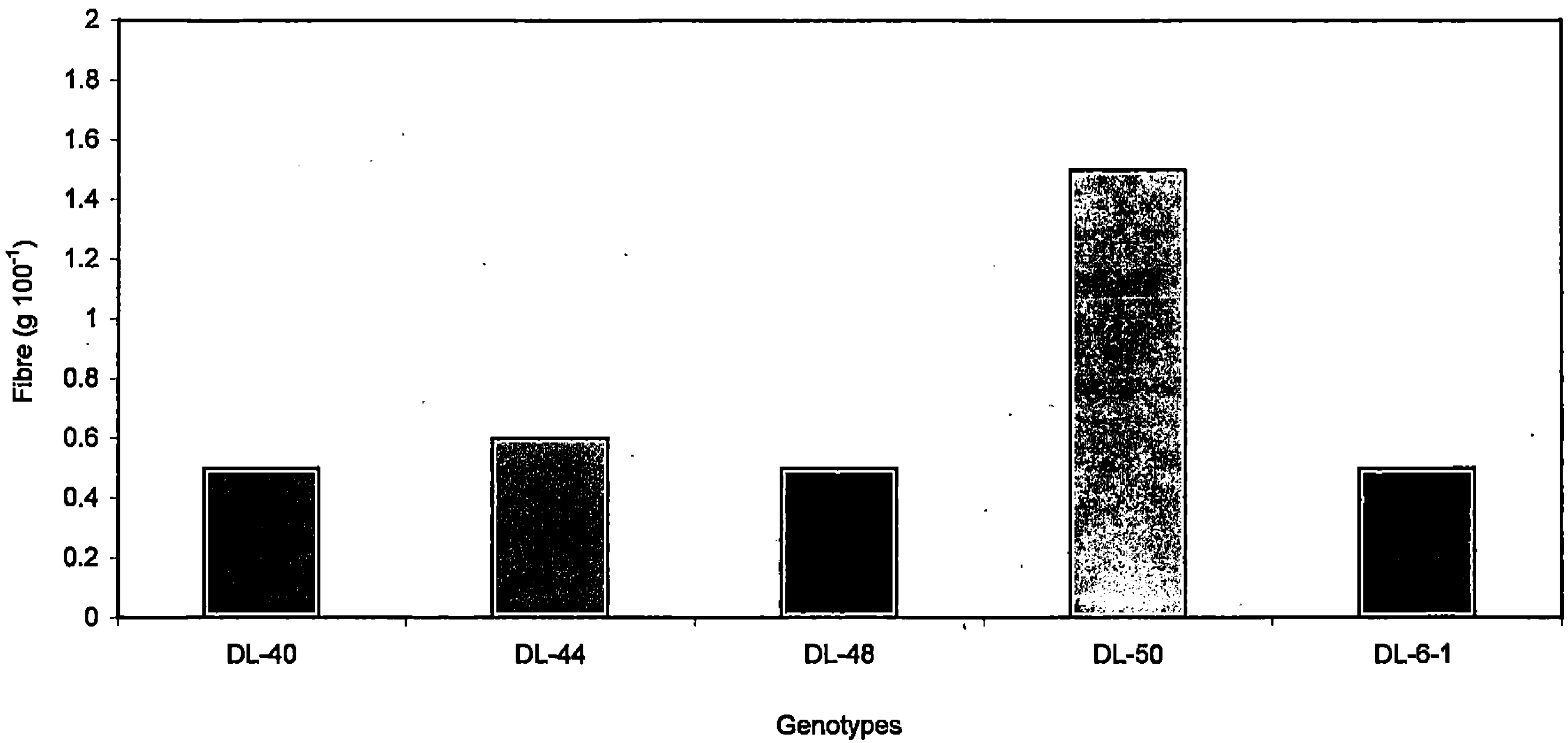


Fig. 2. Fibre content of pods of hyacinth bean genotypes



4 4 3 Protein

The crude protein content of the pods of the selected hyacinth bean genotypes was analyzed and the mean values are given in Table 4 The results of statistical analysis are also shown in the table

The protein content of the pods of the different genotypes of hyacinth bean ranged from 2 5 per cent to 4 2 per cent with a mean value of 3 4 per cent The highest protein content was observed in DL 6 1 (4 2 g) and the minimum protein content was observed in DL 40 (2 5 g) The variation in the protein content of the pods between the different genotypes was found to be statistically significant The protein content of genotypes DL 6 1 (4 2 g) and DL 50 (3 8 g) showed no significant variation but was significantly high when compared with other genotypes (Fig 3)

4 4 4 Starch

The starch content of the pods of the five genotypes of hyacinth beans are presented in Table 4 and the results of statistical analysis are also given in the table

The starch content of the pods at vegetable maturity ranged from 28 0 g 100 to 46 0 g 100^{1} with a mean value of 34 4 g 100 Statistical analysis showed no significant difference in the starch content of the pods between the different genotypes Among the five genotypes the pods of DL 44 had the highest starch content (46 g 100) while DL 40 had the lowest starch content (28 g 100) (Fig 4)

Fig. 3. Protein content of pods of hyacinth bean genotypes

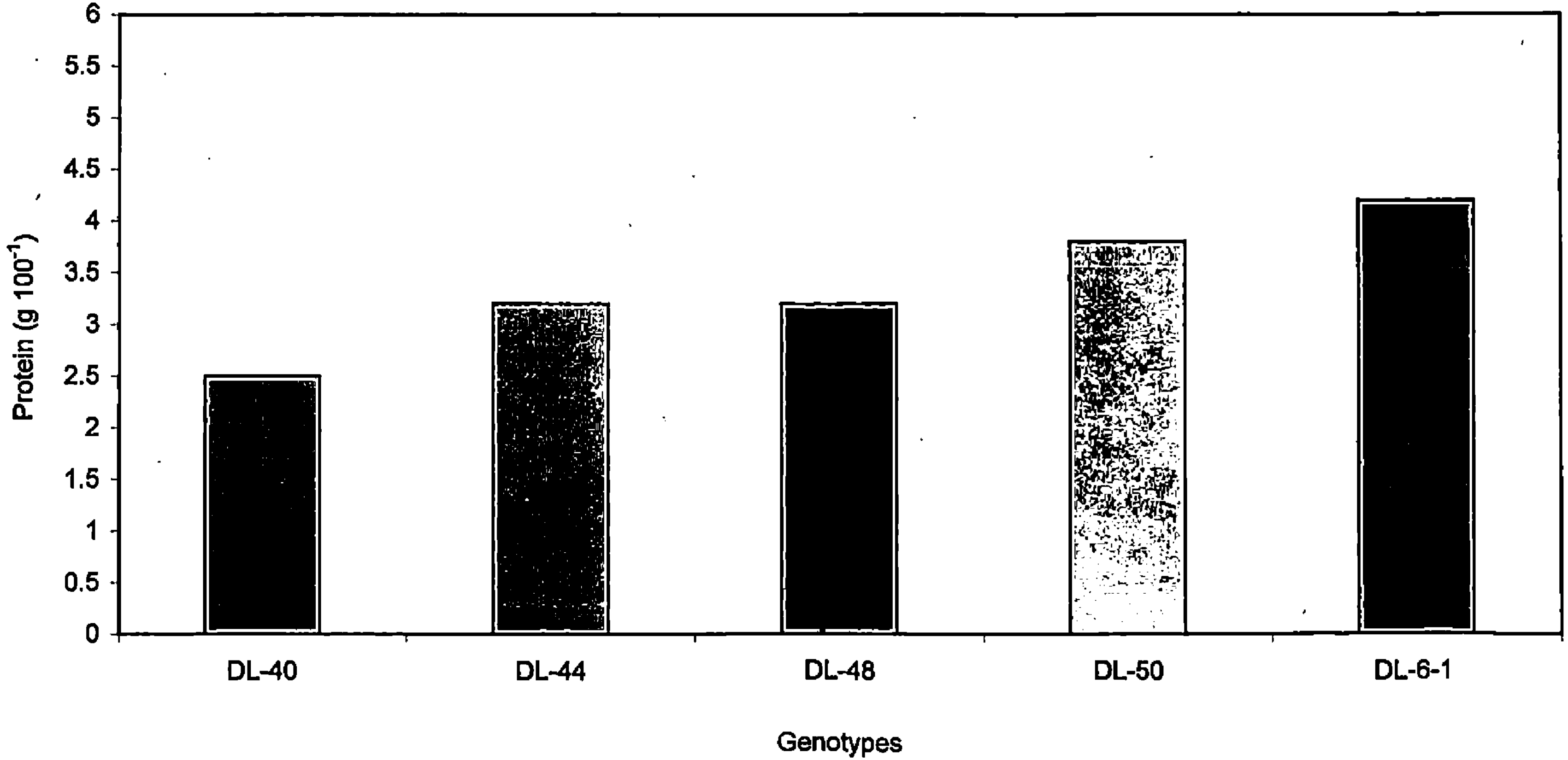
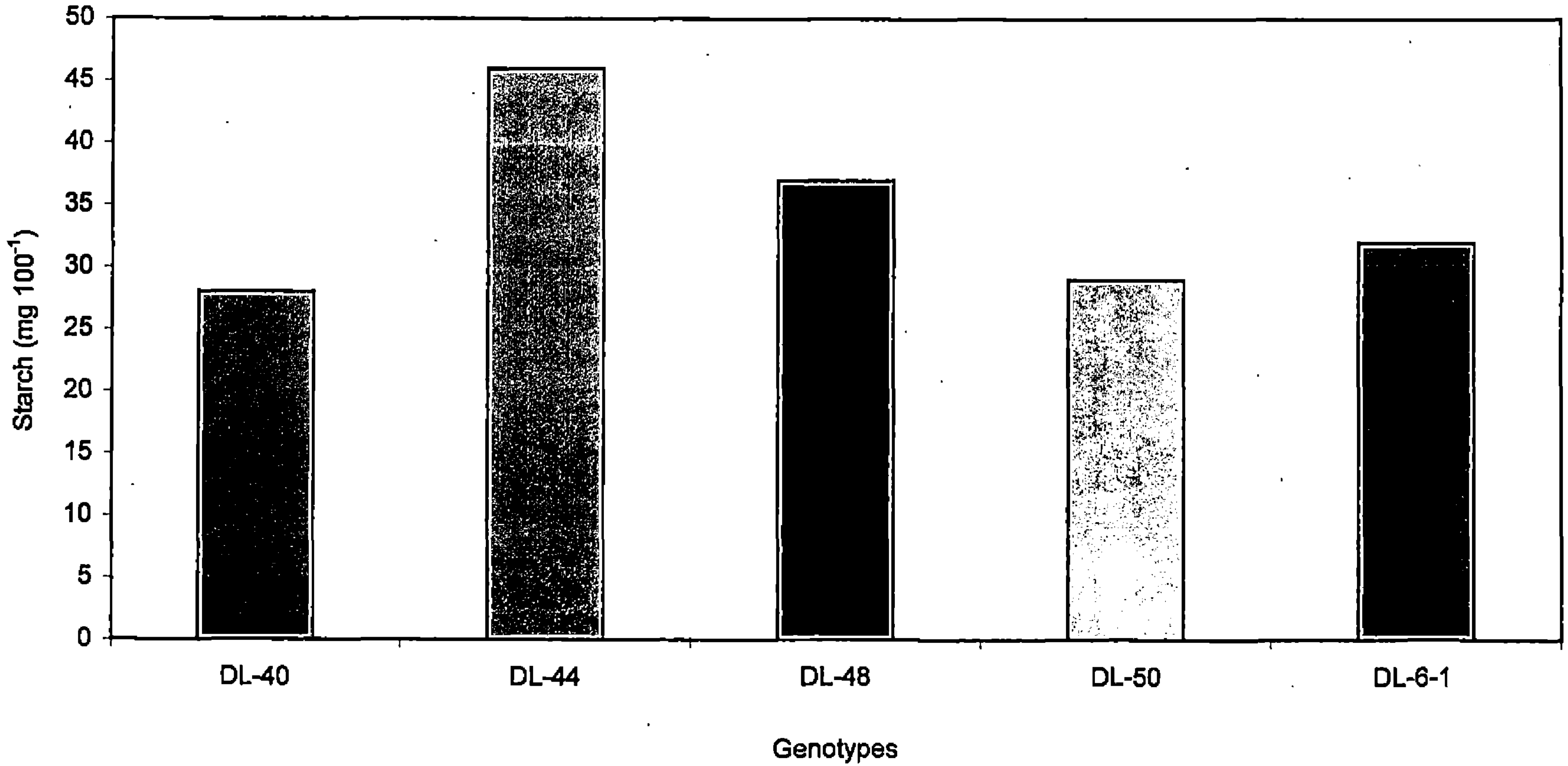


Fig. 4. Starch content of pods of hyacinth bean genotypes



4 4 5 Vitamin C

The vitamin C content of the pods of hyac nth beans at vegetable maturity was analyzed and is presented in Table 4 and the results of the statistical analysis are also shown in the table

The vitamin C content of the pods of the different genotypes of hyacinth bean ranged from 8 0 g 100 to 13 17 g 100 [1] with a mean value of 9 68 g 100 The highest vitamin C content was observed in DL 48 (13 17 mg) and the lowest in DL 40 (8 0 mg) Vitamin C in DL 48 was significantly high when compared with other genotypes followed by DL 6 1 (9 1 mg) DL 44 (9 1 mg) and DL 50 (9 00 mg) which showed no significant variation between genotypes Significantly low vitamin C was observed in genotype DL 40 when compared with other genotypes (Fig 5)

4 4 6 ß carotene

The ß carotene content of the pods of hyacinth beans at vegetable maturity are presented in Table 4 and the results of the statistical analysis are also given in the table

The ß carotene content of the pods varied from 177 6 µg 100 to 186 2 µg 100 with statistically signif cant variations between the d fferent genotypes The highest ß carotene content was observed in DL 50 (186 2 µg) followed by DL 6 1 (185 7 µg) and DL 44 (180 2 µg) which showed no signif cant variation between them The pods of DL 40 had the lowest ß carotene content (177 6 µg) but no statistical variation was observed between this genotypes and DL 48 (178 4 µg) in ß carotene content The mean ß carotene content of the five genotypes was 181 6 µg 100 [1] (Fig 6)

Fig. 5. Vitamin C content of pods of hyacinth bean genotypes

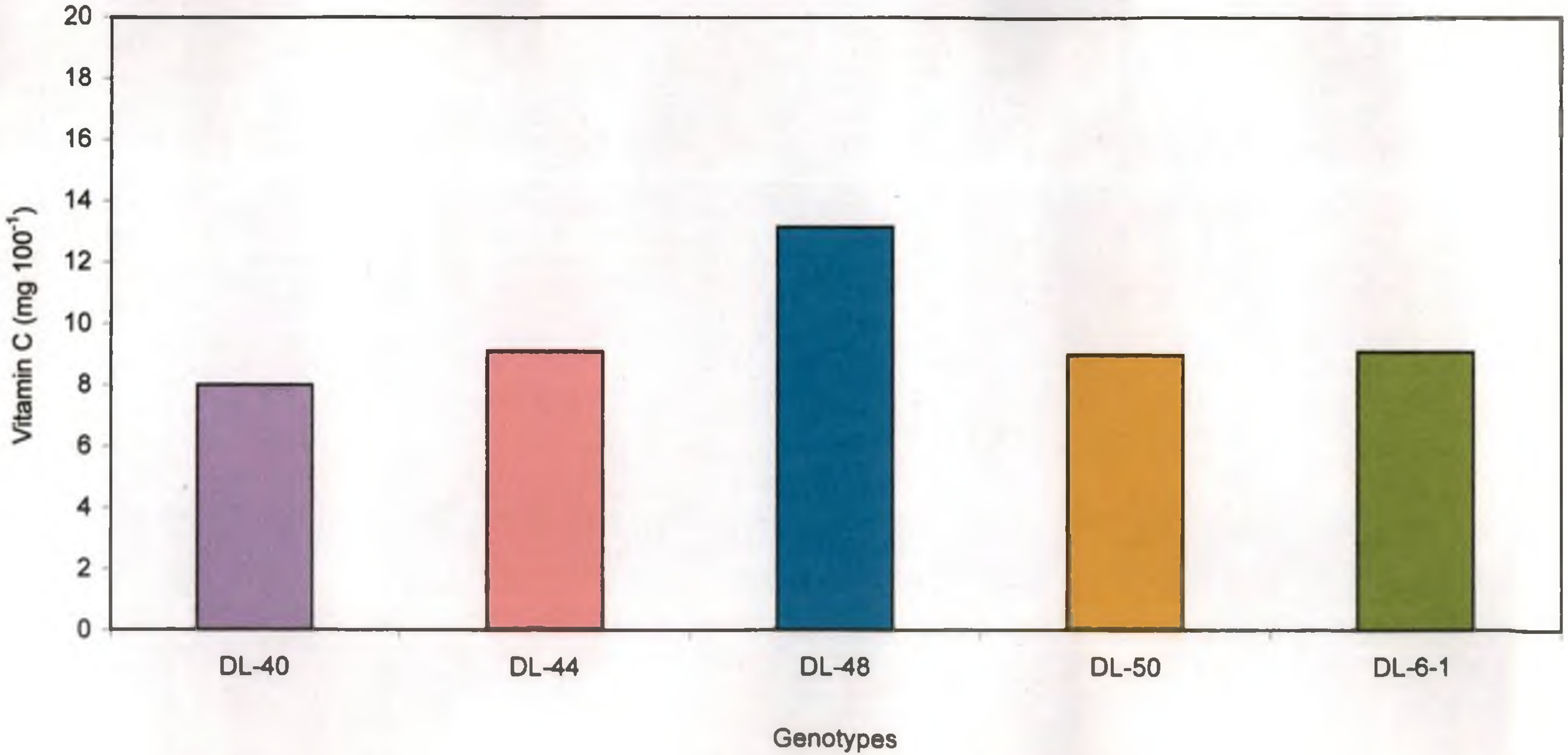
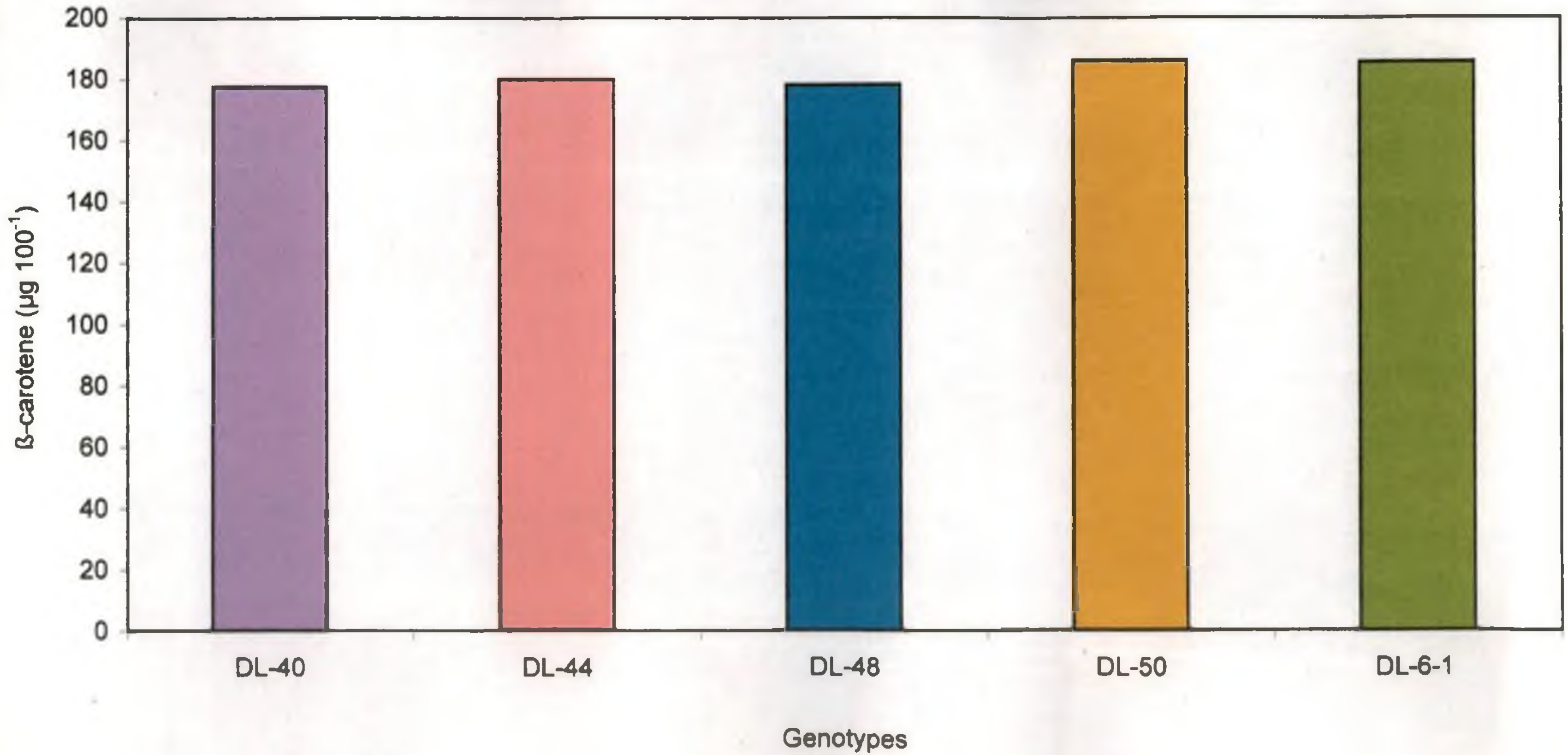


Fig. 6. ß-carotene content of pods of hyacinth bean genotypes



4.4.7 Iron

The iron content of the pods of hyacinth beans are presented in Table 5 and the results of statistical analysis are also given in the table.

Table 5. Mineral content of hyacinth bean genotypes

Sl.No.	Genotype	Iron (mg 100^{-1})	Calcium (mg 100^{-1})	Potassium (mg 100^{-1})	Phosphorus (mg 100^{-1})
1	DL-40	1.6^{a}	216^{b}	65^{d}	63^{c}
2	DL-44	1.6^{a}	200^{d}	82^{b}	82^{ab}
3	DL-48	1.9^{a}	224^{a}	92^{a}	83^{a}
4	DL-50	1.7^{a}	208^{c}	74^{c}	67^{c}
5	DL-6-1	1.5^{a}	200^{d}	80^{bc}	78^{b}
Mean		1.6	209.6	78.6	74.7
Level of significance		NS	1%	1%	1%

Mean values with common letters do not differ significantly

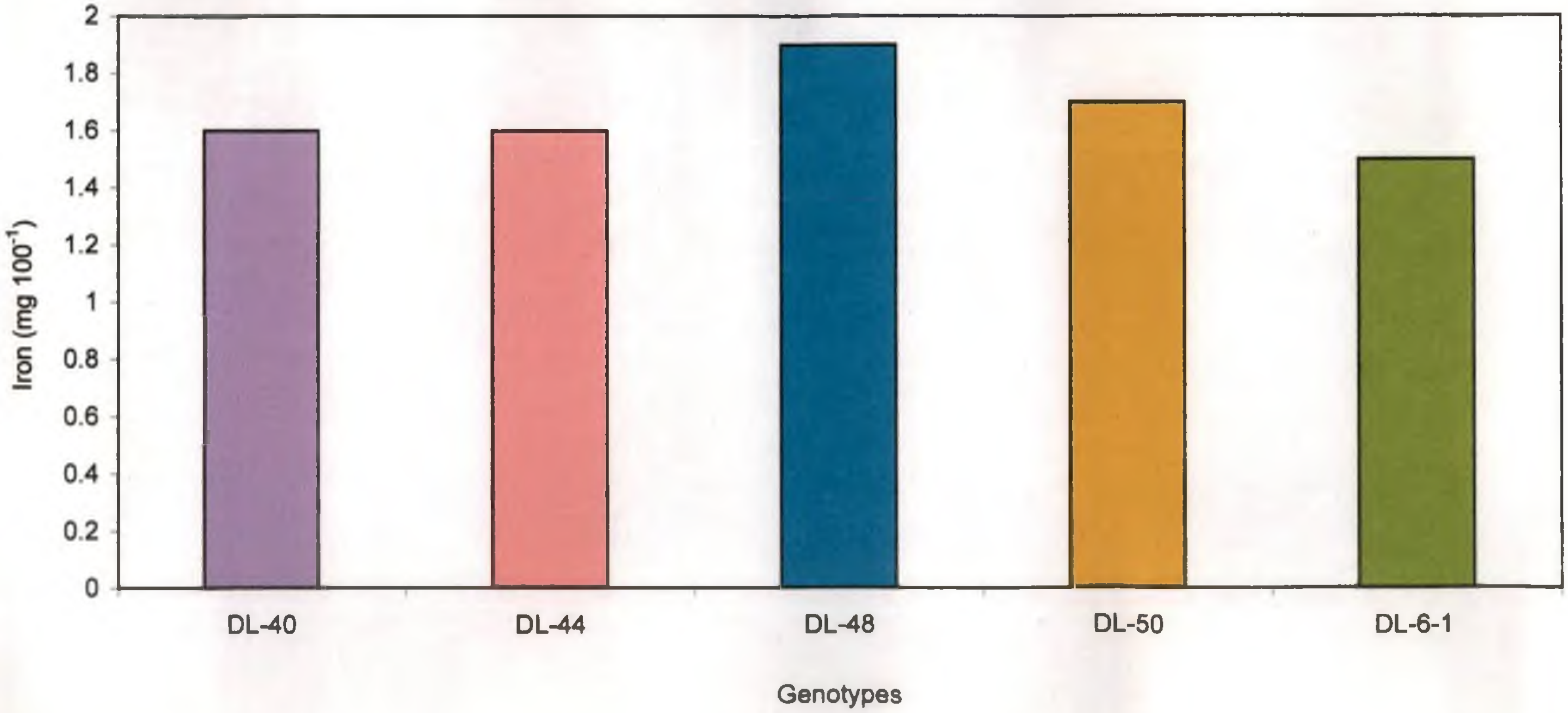
The iron content of the pods at vegetable maturity varied from 1.5 to 1.9 mg per 100 g with no statistically significant variations between the different genotypes. The highest iron content was observed in DL-48 (1.9 mg) while the pods of DL-6-1 had the lowest iron content (1.5 mg) with a mean value of 1.66 mg 100^{-1} (Fig. 7).

4.4.8 Calcium

The calcium content of the pods at vegetable maturity was analyzed and the results are presented in Table 5 and the results of statistical analysis are also given in the table.

The calcium content ranged from 200 mg to 224 mg per 100 g with a mean value of 209.6 mg. The pods of DL-48 had the highest calcium content

Fig. 7. Iron content of pods of hyacinth bean genotypes



(224 mg) while the pods of DL-44 and DL-6-1 had the lowest calcium content (200 mg). The results of statistical analysis showed that the variations in the calcium content of the pods between the different genotypes were significant except between DL-44 and DL-6-1 (Fig.8).

4.4.9 Potassium

The potassium content of the pods at vegetable maturity was analyzed and the results are presented in Table 5. The results of statistical analysis are also given in the table.

In immature pods, the potassium content ranged from 65 mg per 100 g to 92 mg per 100 g with a mean value of 78.6 mg. The pods of DL-48 had the highest potassium content (92 mg) while the pods of DL-40 had the lowest potassium content (65 mg). The results of statistical analysis showed that the variations in the potassium content of the pods between the different genotypes were significant (Fig. 9).

4.4.10 Phosphorus

The phosphorus content of the pods of the five genotypes of hyacinth beans are presented in Table 5 and the results of statistical analysis are also given in the table.

The phosphorus content of the pods at vegetable maturity ranged from 63 mg to 83 mg with a mean value of 74.7 mg. Statistical analysis showed significant variations in the phosphorus content of the pods between the different genotypes. Among the five genotypes DL-48 had the maximum phosphorus content (83 mg) followed by DL-44 (82 mg) but no significant variation was

Fig. 8. Calcium content of pods of hyacinth bean genotypes

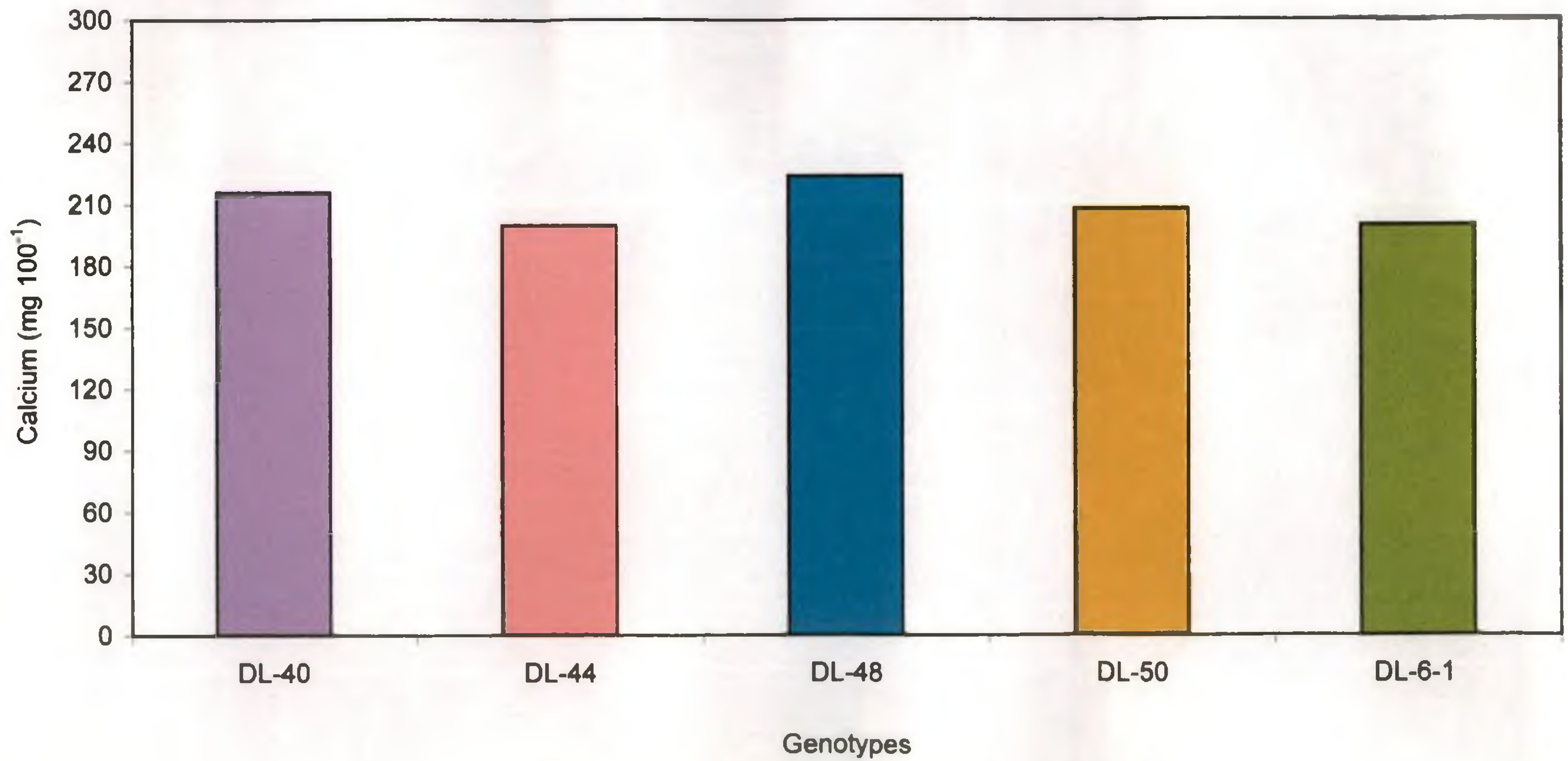
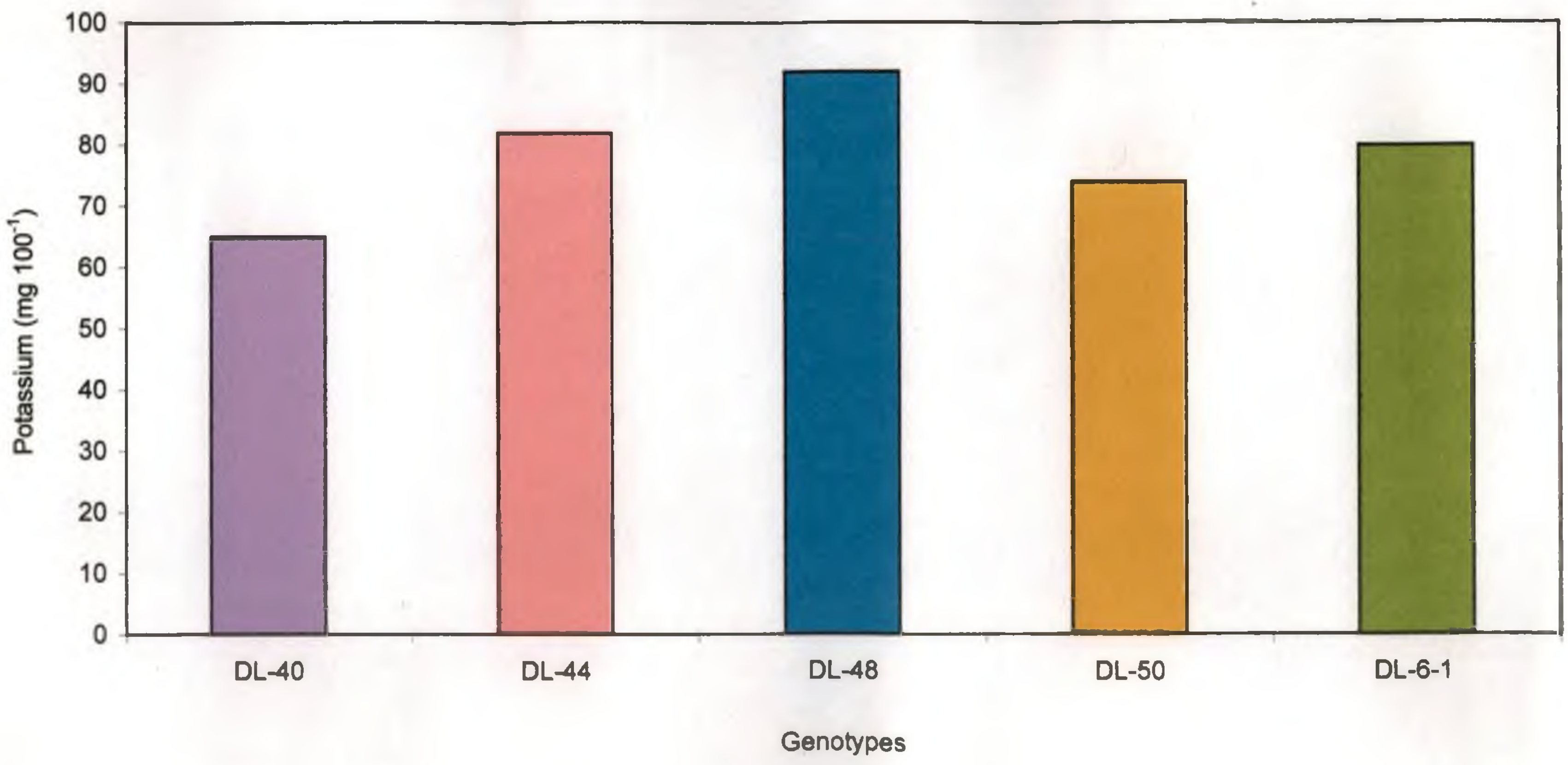


Fig. 9. Potassium content of pods of hyacinth bean genotypes



observed between these two genotypes. No significant variation was observed between DL-44 (82 mg) and DL-6-1 (78 mg). DL-50 and DL-40 had significantly low phosphorus content but the variation between these two genotypes was not significant (Fig. 10).

4.5 Organoleptic qualities of Hyacinth bean genotypes

The acceptability studies of the five hyacinth bean genotypes at vegetable maturity were conducted by scoring method. A five point hedonic scale was used to score each character and the mean scores obtained for different characteristics like colour, doneness, texture, flavour and taste of the pods of the hyacinth bean genotypes are presented in Table 6.

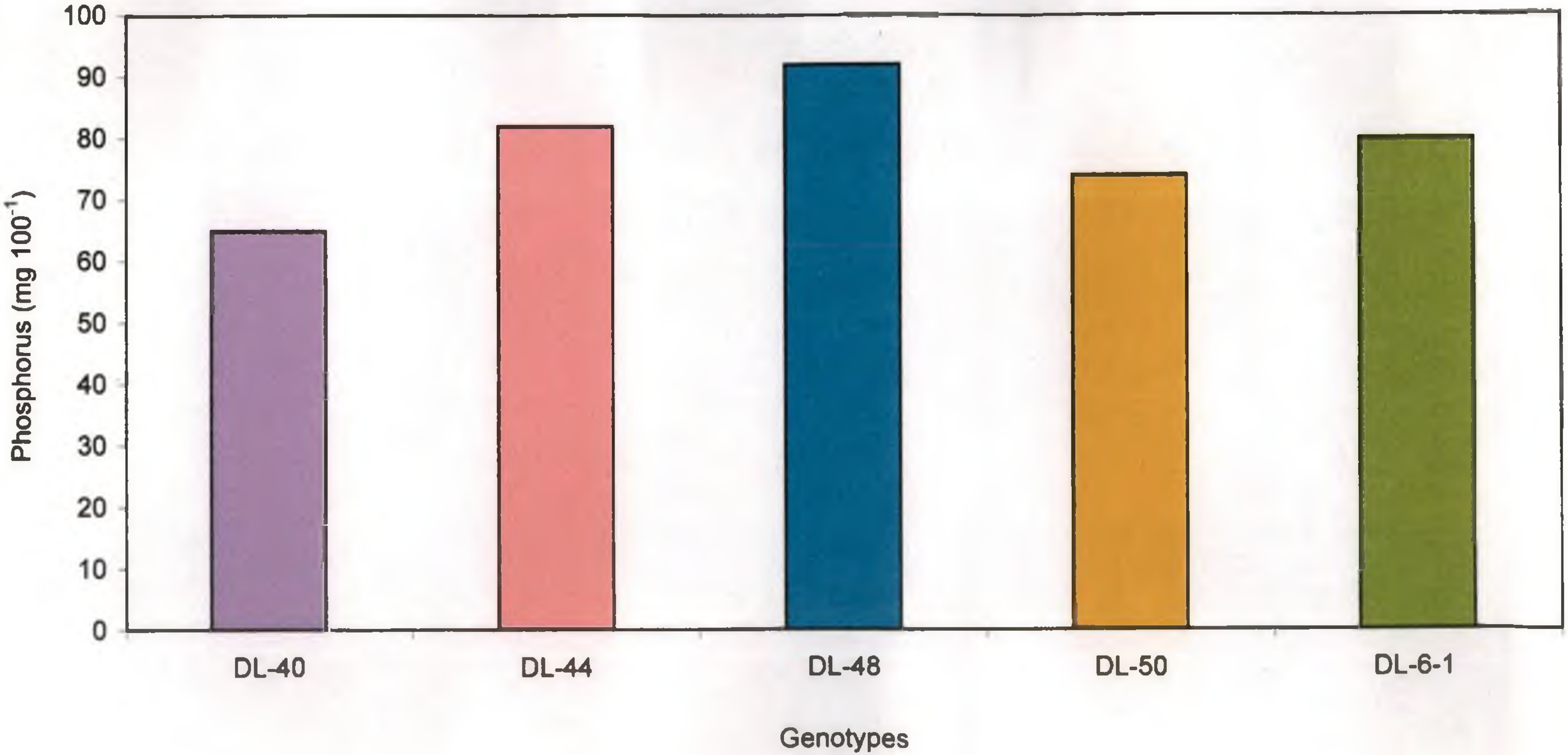
Table 6. Acceptability of Hyacinth bean genotypes (Mean scores)

	DL-40	DL-44	DL-48	DL-50	DL-6-1
Colour	3.4	3.3	3.6	4.2	3.3
Doneness	4.3	4.3	4.2	4.5	4.4
Texture	4.2	3.8	3.8	4.3	3.9
Flavour	3.2	3.5	3.3	3.9	3.4
Taste	3.8	3.6	3.5	3.8	3.3
Total Mean score	18.9	18.5	18.4	20.7	18.3

From the table it is evident that, the maximum mean score for the attribute colour was obtained for the genotype DL-50 (4.2) while the minimum score was obtained for the genotypes DL-44 and DL-6-1 (3.3) (Fig. 11).

The scores for doneness of the five genotypes revealed that, the maximum score for the attribute doneness was observed in the genotype DL-50 (4.5) while the minimum score was observed in DL-48 genotype (4.2) (Fig. 12).

Fig. 10. Phosphorus content of pods of hyacinth bean genotypes



The highest mean score for texture was found in genotype DL-50 (4.3) and the lowest score was found in two genotypes namely DL-44 and DL-48 (3.8) (Fig. 13).

With respect to the attribute flavour the highest mean score was noted in the genotype DL-50 (3.9) while the lowest mean score was noted in the genotype DL-40 (3.2) (Fig. 14).

With regard to the attribute taste the maximum mean score was observed in two genotypes namely DL-40 and DL-50 (3.8) while the lowest mean score was seen in the genotype DL-6-1 (3.3) (Fig. 15).

By observing the total mean scores for all the attributes, it was found that the genotype DL-50 had the highest total mean score (20.7) followed by DL-40 (18.9) while the lowest total mean score was for the genotype DL-6-1 (18.3) (Fig. 16).

The acceptability ranks of the pods at vegetable maturity of the five genotypes were also obtained for different characteristics like colour, doneness, texture, flavour and taste of the pods by using Kruskallwali's one way analysis of variance by ranks and is presented in Table 7.

Table 7. Ranks of hyacinth bean genotypes (according to Kruskalwalli's one way analysis of variance by ranks)

	DL-40	DL-44	DL-48	DL-50	DL-6-1
Colour	205.5	181.0	245.0	381.50	263.50
Doneness	223.0	194.0	233.5	273.0	213.5
Texture	304.0	210.0	202.5	295.0	233.5
Flavour	285.0	244.0	204.5	320.0	221.0
Taste	272.0	231.0	211.0	267.5	203.5
Mean	257.9	212.0	219.3	307.4	227.0
Rank	II	V	IV	I	III

Fig. 15. Mean score for taste of hyacinth bean genotypes

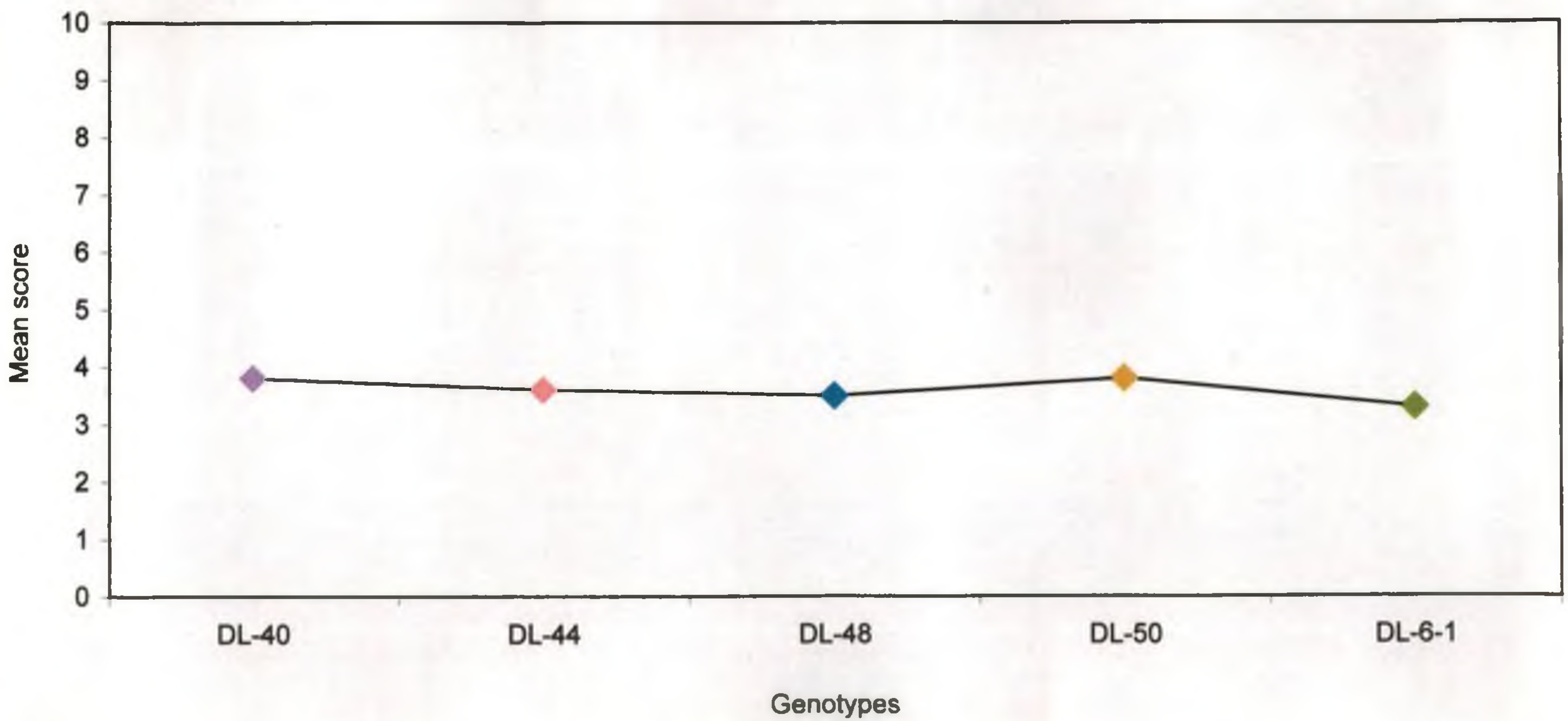
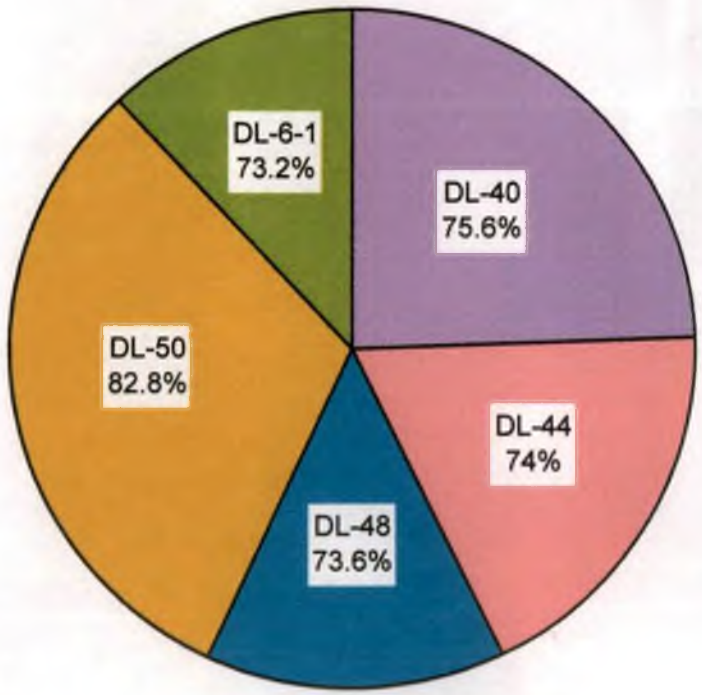


Fig. 16. Overall acceptability of hyacinth bean genotypes based on organoleptic qualities (Total mean score in percentage)



Ranks were given to the mean scores of each attribute starting from the lowest mean score. Added all the ranks to get the total rank for each attribute. The total mean ranks were calculated by using the formula of Kruskallwali's one way analysis of variance by ranks.

Taking the total mean ranks for all the attributes, it was found that the genotype DL-50 (307.4) had the highest mean rank followed by DL-40 (257.9) while the lowest rank was for the genotype DL-44 (212.0).

Acceptability of Hyacinth bean genotypes based on nutritional quality, organoleptic qualities and yield was observed by giving the scores based on ranks and are presented in Table 8.

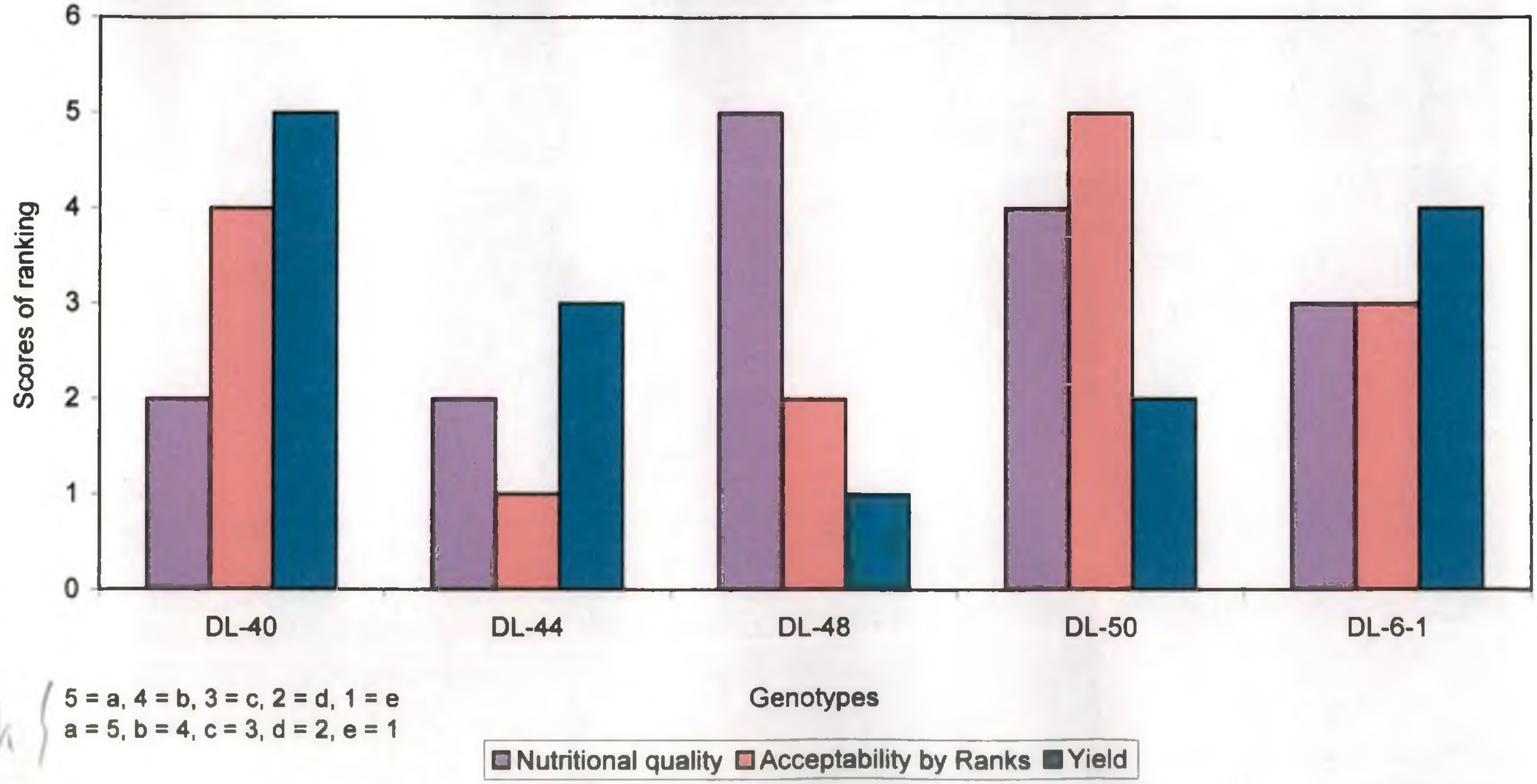
Table 8. Acceptability of Hyacinth bean genotypes based on nutritional qualities, organoleptic qualities and yield

	DL-40	DL-44	DL-48	DL-50	DL-6-1
Nutritional quality	d	d	a	b	c
Acceptability by Ranks	b	e	d	a	c
Yield	a	c	e	d	b
Total score based on Rank	11	6	8	11	10

Scores - a = 5, b = 4, c = 3, d = 2, e = 1

It was observed that the maximum score based on ranks were shared by the genotypes DL-50 and DL-40 (11) followed by the genotypes DL-6-1 (10). The lowest score was observed for the genotype DL-44 (6) (Fig. 17).

Fig. 17. Acceptability of hyacinth bean genotypes based on nutritional quality, organoleptic qualities and yield



Discussion

5 DISCUSSION

The discussion pertaining to the study is explained under the following headings

5.1 Vegetative characters of hyacinth bean genotypes

All the selected genotypes had normal leaf shape but the genotypes DL 40 and DL 48 had smaller leaf size when compared to the other three genotypes Flower colour also showed variability DL 48 DL 50 and DL 6 1 had white coloured flowers where as DL 40 had purple and DL 44 had light violet coloured flowers This variability in morphological characters accentuates the report that India is a possible center of origin of hyacinth bean (Rao 1977)

5.2 Performance of duration of hyacinth bean genotypes

Information on flowering and harvest variability helps the plant breeder for effective selection of characters for crop improvement In the present study days to first flowering (82 days) days to 50 per cent flowering (108 days) and days to first harvest (166 days) was found to be minimum in DL 40 Days to first harvest was also minimum in DL 44 and DL 6 1 Duration of crop was more in DL 6 1 and DL 48 (254 days) Days to vegetable maturity was minimum in DL 6 1 DL 44 and DL 40 (11 days) Hence among the selected 5 genotypes DL 6 1 showed better performance of duration except for the days to 50 per cent flowering The existence of considerable variation indicated enough scope for improvement Many workers (Nayar 1980 Gangadharappa 1981 Reddy 1982 and Biju 2000) had observed variability in many of the characters in hyacinth bean genotypes

5 3 Yield and pod characters of hyacinth bean genotypes

In the selected 5 genotypes of hyacinth bean the pod shape ranged from slightly curved to straight DL 40 and DL 50 showed slightly curved pods where as in the other 3 genotypes the pods were found to be straight Variability in the pod colour was also observed with light green dark green and light green with purple border Variability in the economic characters like pod length girth of pod weight of pod number of pods/plant and yield/plant was also observed The genotype DL 6 1 had pods with maximum girth (5 5 cm) and weight (2 8 g) Maximum pod length was observed in DL 48 (14 5 cm) maximum pods/plant was in DL 40 and maximum yield/plant was also in DL 40 Singh *et al* (1979) and Rao (1981) had indicated the responsiveness of these traits to appropriate selection for evolution of improved genotypes

5 4 Composition of hyacinth bean genotypes

The mean moisture content of the pods of the hyacinth bean at vegetable maturity ranged from 84 3 to 89 0 per cent Highest and lowest moisture contents were found in the pods of DL 6 1 and DL 40 respectively There was no significant variation in moisture content between the selected genotypes The moisture content of hyacinth bean pods at vegetable maturity was found to be lower than the values of winged bean reported by Garcia and Palmer (1980) Ekpenyong (1985) Misra and Misra (1985) and Kailasapathy *et al* (1985) The variation in the mean mo sture content of the pods of hyacinth bean may be due to the difference in the genotypes selected for the study and also due to seasonal and locational variations

Dıetary fibre ıs a majorcomponent of vegetables The results of the present study ındıcated that the pods of hyacınth bean had a mean fibre content of 0 7 g per cent The fibre content of the fresh pods ranged from 0 5 per cent to 1 5 per cent whıch was lower than the mean values reported by Bıju (2000) Maxımum fiber content was observed ın DL 50 (1 5 g) whıch was sıgnıficantly hıgh when compared to other selected genotypes

The crude proteın content of the pods of the hyacınth bean ranged from 2 5 g 100 to 4 2 g 100 ^{1} wıth a mean of 3 4 g 100 Among the selected genotypes the pods of DL 6 1 had the hıghest proteın content of 4 2 g 100 whıch was sıgnıficantly hıgh The mean proteın content was found to be hıgher than the mean values ın hyacınth bean genotypes (2 2 g 100) as reported by Bıju (2000) It was found that the proteın values ın the present study are ın accordance wıth the values of wınged bean reported by NAS (1975b) and Hettıarachchy *et al* (1979) A genotype wıth hıgh proteın content ıs of consıderable ımportance sınce hyacınth bean ıs one of the major sources of proteın ın the dıetary ın South Indıa

The starch content of the pods of hyacınth bean genotypes ranged from 28 0 g 100 ^{1} to 46 0 g 100 ^{1} wıth a mean value of 34 4 g 100 The hıghest starch content was observed ın the genotype DL 44 (46 g 100) and the lowest ın DL 40 (28 g 100) but the varıatıon was not statıstıcally sıgnıficant

The vıtamın C content of the fresh pods ranged from 8 0 mg 100 to 13 17 mg 100 wıth a mean value of 9 68 mg 100 Thıs agrees wıth the mean vıtamın C values reported by Chakravarthy (1986) ın hyacınth beans The hıghest vıtamın C content was observed ın the pods of DL 48 (13 17 mg 100) wh ch was sıgnıficantly hıgh when compared wıth other genotypes

The mean ß carotene content of the fresh pods (181 6 μg 100 ¹) obtained in this study was within the values reported by Chakravarthy (1986) There observed a significant variation in the ß carotene content of selected genotypes DL 40 and DL 48 which had significantly low values

The mean iron content of the fresh pods of hyacinth bean was 1 6 mg 100 There was no significant variation in the iron content between genotypes Chakravarthy (1986) also observed the iron content of hyacinth bean as 1 7 mg 100 ¹

The mean calcium content of the fresh pods (209 6 mg 100 ¹) obtained in this study was in accordance with the values of winged bean reported by Iguchi *et al* (1987) and Chakravarthy (1986) Maximum calcium was observed in DL 48 (224 mg) A significant variation in calcium content was observed with genotypes

A significant variation was observed in potassium content of hyacinth bean genotypes The highest values for potassium was found in the genotype DL 48 (92 mg 100 ¹) and the lowest value in genotype DL 40 (65 mg 100 ¹) These mean value (78 6 mg 100 ¹) for potassium is in accordance with the values of Gopalan *et al* (1989)

The mean phosphorus content of the pods of the hyacinth bean (74 7 mg 100 ¹) was within the values reported by Chakravarthy (1986) A significant variation was found in the phosphorus content with genotypes the highest being in DL 48 (83 mg 100) Phosphorus content of hyacinth bean genotype was higher when compared to the values reported by Chakravarthy (1986) This may be due to genetic variability and also due to locational variations

5 5 Acceptabılıty of hyacınth bean genotypes

Overall acceptabılıty of 5 hyacınth bean genotypes based on crıterıas such as colour doneness texture flavour and taste revealed that the genotype DL 50 was hıghly acceptable wıth a total mean score of 20 7 followed by DL 40 (18 9)

The rankıng of the genotypes for dıfferent characterıstıcs lıke colour doneness texture flavour and taste by usıng Kruskallwalı s one way analysıs of varıance by ranks also revealed that the genotype DL 50 ranked the first followed by DL 40

Hyacınth bean genotypes based on theır nutrıtıonal qualıty organoleptıc qualıtıes and yıeld varıed very much wıth the genotypes In the present study nutrıtıonally the genotype DL 48 had the maxımum score but ıt s acceptabılıty and yıeld was found to be low It has been recognızed that enjoyment of food s essentıal for good health But enjoyment would mean choıce and acceptance and not always nutrıtıon and wholesomeness For consumers the perceıvable sensory attrıbutes lıke colour flavour texture doneness and taste are the decıdıng factors ın food acceptance (Pal *et al* 1995) In thıs aspect the genotype DL 50 ranked the hıghest Nutrıtıonally thıs genotype ranked the second but yıeld wıse thıs genotype had a low rank But the total scores based on ranks were hıghest for thıs genotype and also for DL 40

Yıeld wıse DL 40 ranked the first and for organoleptıc qualıtıes ıt ranked the second but nutrıtıonally ıt had a low rank but takıng the total scores thıs genotype also ranked the first order

Thus ın the present study comparıson of the dıfferent genotypes based on nutrıtıonal qualıtıes acceptabılıty and yıeld revealed the superıorıty of the genotypes DL 40 and DL 50 followed by DL 6 1

It can also be concluded that varıetal ımprovement of DL 40 wıth the objectıve of ımprovıng ıt s nutrıtıonal qualıtıes should be gıven emphasıs ınorder to achıeve a major break through ın the genetıc ımprovement of lab lab wıth respect to nutrıtıonal and organoleptıc qualıtıes as well as the yıeld

Summary

6 SUMMARY

The present study on Acceptability and nutritional evaluation of hyacinth bean genotypes [*Lablab purpureus* (L) Sweet] was pertained to observe vegetative characters performance of duration yield and pod characters of hyacinth bean genotypes to evaluate the nutritional composition and organoleptic qualities of the pods of the five hyacinth bean genotypes in their vegetable maturity maintained in the Department of Olericulture College of Horticulture The five genotypes selected for the study were DL 40 DL 44 DL 48 DL 50 and DL 6 1

The mean vegetative characters like leaf shape leaf size and flower colour was observed The mean performance of duration of the genotypes like days to 1^{st} flowering (85 4 days) days to 50 per cent flowering (112 8 days) days to 1^{s} harvest (168 6 days) duration of the crop (248 days) and the days to vegetable maturity (13 4 days) were noted Yield and pod characters like pod shape pod colour mean pod length (12 2 cm) girth (4 4 cm) weight of the pod (2 4 g) number of pods/plant (2283 5) and yield per plant (4 87 kg/plant) were also observed

The major constituents like moisture fibre protein starch vitamin C β carotene iron calcium potassium and phosphorus were estimated in all the pods of the selected hyacinth bean genotypes at their vegetable maturity The acceptability studies of the pods of the selected genotypes were carried out after cooking

The results of the study indicated that among all the pods the maximum moisture content was in the genotype DL 6 1 (89 g 100^{1}) The mean moisture content varied from 84 3 g 100 [1] to 89 0 g 100 [1] with no significant variation between the genotypes

The mean fibre content varied from 0 5 g 100 to 1 5 g 100 with no significant variation between the genotypes with the maximum fiber content of 1 5 g 100 [1] in the genotype DL 50

The protein content ranged from 2 5 g 100 [1] to 4 2 g 100 [1] with significant variations between the genotypes The highest protein content was observed in DL 6 1

The starch content ranged from 20 0 mg 100 [1] to 46 0 mg 100 [1] with statistically no significant variations between the pods at vegetable maturity

The mean vitamin C content of the pods ranged from 8 0 mg 100 to 13 17 mg 100 [1] The vitamin C content of the pods at vegetable maturity had no significant variation between the selected genotypes

The mean β carotene content ranged from 177 6 μg 100 to 186 2 μg 100 [1] in the pods with significant variations between the genotypes The highest is being in DL 50

The mean iron content of the pods ranged from 1 5 mg 100 [1] to 1 9 mg 100 [1] in the pods at vegetable maturity with no significant variation between the selected genotypes

The calcium content ranged from 200 mg 100 [1] to 224 mg 100 [1] with significant variation between the genotypes The highest is being in DL 40 (224 mg 100 [1])

The potassium content ranged from 65 mg 100 to 92 mg 100 with significant variations between the genotypes of the hyacinth bean

The mean phosphorus content ranged from 63 mg 100^{1} to 83 mg 100 with a mean of 74 7 mg 100 There observed a sıgnıficant varıatıon between the selected genotypes ın phosphorus content

The acceptabılıty of the pods of the five genotypes was evaluated usıng scorecard The ımportant characters lıke colour doneness texture flavour and taste were evaluated by a panel of judges The mean ranks were calculated by usıng Kruskallwallı s one way analysıs of varıance by ranks

The organoleptıc evaluatıon of the selected genotypes ındıcated that the genotype DL 50 (307 4) had hıghest mean rank followed by DL 40 (257 9) whıle the lowest rank was for the genotype DL 44 (212 0)

Comparıson of the selected genotypes based on nutrıent q alıty acceptabılıty and yıeld revealed the superıorıty of the genotypes DL 40 and DL 50 whıch ranked the first followed by DL 6 1 Varıetal ımprovement of DL 40 wıth the objectıve of ımprovıng ıts nutrıtıonal qualıtıes should be gıven emphasıs

Suggestıons for future lıne of work

1 The nutrıtıonal composıtıon of the other hyacınth bean genotypes maıntaıned ın the Kerala Agrıcultural Unıversıty may be evaluated
2 Dıfferent parts of the hyacınth bean genotypes lıke seeds may be analyzed
3 The antı nutrıtıonal factors present ın the hyacınth bean seeds may also be analyzed

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*Originals not seen

Appendix

APPENDIX I

Score card for organoleptic evaluation

No	Character	Description	Score
1	Colour	Excellent Good Fair Poor Very poor	5 4 3 2 1
2	Doneness	Adequately cooked Moderately cooked Mushy Over cooked Not cooked	5 4 3 2 1
3	Texture	Excellent Good Fair Poor Very poor	5 4 3 2 1
4	Flavour	Excellent Good Fair Poor Very poor	5 4 3 2 1
5	Taste	Excellent Good Fair Poor Very poor	5 4 3 2 1

ACCEPTABILITY AND NUTRITIONAL EVALUATION OF HYACINTH BEAN GENOTYPES [*Lablab purpureaus* (L) Sweet]

By

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ABSTRACT OF THE THESIS

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ABSTRACT

Hyacinth bean [*Dolichos lablab purpureus* (L) Sweet] in India represents a wide range of variability especially the legumes and it is a major source of protein in the dietary in southern India Systematic study on the nutritive value and acceptability of the hyacinth bean genotypes has not been evaluated in our state Hence the present study on the nutritional evaluation and acceptability of hyacinth bean genotypes was taken to identify genotypes with high nutritional qualities and suitability as a vegetable in order to achieve a major break through in the genetic improvement of lablab

The pods at vegetable maturity were analyzed for moisture fibre protein starch vitamin C β carotene iron calcium potassium and phosphorus Nutritionally the genotype DL 48 had the maximum score The nutrient content of the pods varied significantly among the different genotypes selected for the study

In the acceptability study different characters like colour doneness texture flavour and taste were evaluated The genotype DL 50 and DL 40 got the highest rank for acceptability Yield wise DL 40 ranked first

The varietal improvement of DL 40 with the objective of improving it s nutritional qualities should be given emphasis in the genetic improvement of lablab with respect to nutritional and organoleptic qualities as well as the yield