VARIETIAL PERFORMANCE OF SPINACH (*SPINACIA OLERACEAE*) AT PRAYAGRAJ AGRO-CLIMATIC CONDITION

ABSTRACT

The research experiment was conducted at the Department of Horticulture's, SHUATS, Prayagraj during the year 2022.The experiment was laid out in Randomized Block Design comprising of 9 varieties *viz.,* V^1: All Green, V^2: Space Spinach, V^3: Red kitten Spinach, V^4: Catalina Spinach, V^5: Bloomdale, V^6: Perpetual Spinach, V^7: Indian summer Spinach, V^8: Punjab Green, V^9: Corvair spinach with three replications. The Observations were recorded as per the growth and yield parameters. The findings reveal that the treatment T_6 (Perpetual Spinach) was found to be the most suitable over all the other varietiesin relation to the growth and yield of Spinach.

Keywords: Spinach (*Spinacia oleraceae)*, Growth, Yield and Economics.

INTRODUCTION

Spinach (Spinacia oleracea L.) is a green leafy flowering vegetable plant belonging to the family Amaranthaceae with chromosome number 2n=12. The word "Spinach" is derived from the Persian word for "Green Hand".It is native to Southwestern and Central Asia, but today spinach is cultivated worldwide, mainly in temperate regions. Spinach leaves have a high nutritional value especially when consumed fresh, steamed, rapidly boiled, frozen, and canned. Spinach is also a good source of fat therefore, suitable food to lose weight and for diabetic people. It is also a good source of chlorophyll, which is known to aid in digestion.

The edible part of the spinach plant is the "compact rosette shape" of leaves attached to a short stem. The first stage of the plant's life cycle is the vegetative rosette stage i.e. formation of leaves. The second stage of the plant's life cycle is the flowering stage or the bolting stage i.e. there is a growth of elongated stalk along with flowers growing from within the main stem of the plant. Once the plant reached the bolting

stage, there is no longer possible to harvest marketable leaves. Spinach has a deep taproot and a shallow yet extensive branching root system, with most of its feeder roots in the top few inches of the soil. Spinach leaf has 3.2% protein, 0.65% fibre, 0.6% fat and linolenic acid (omega-3) and linoleic acid (omega-6).

There are three basic types of spinach (on the basis of leaves): savoy, semi-savoy, and smooth. Where the savoy-type spinach has dark green, crinkly, and curly leaves and endures the cold weather. The semi-savoy type spinach is a hybrid variety with slightly crinkled leaves which are mostly resistant to diesease. And lastly the smooth-type spinach has broad, smooth leaves and grows more quickly. Two types of spinach are found (on the basis of the color of leaves) i.e. green and red and (on the basis of shape of leaves) i.e. round leaves, semi-round leaves and pointed leaves, and they are in cultivation form being heavier in growth and bears thicker. Spinach can be grown throughout the year round, in fact, the major portion of spinach is harvested during October and November when most other winter vegetables are still in their early growth. During this period, there is a general shortage of vegetables in the market and spinach contributes substantially towards meeting this shortage.

Spinach is a highly desitrable leafy vegetable with a good cooking adoptability, a high nutritive value and many important vitamins (A, C, E and K) and minerals (Iron, Maganese, Zinc, Magnesium, etc.). It also requires less amount of energy for its cooking and saves a significant quantity of energy unlike other kinds of leafy vegetables. Spinach is a very short duration vegetable.

.MATERIALS AND METHODS

The experiment was conducted during the year 2022 in the Departmental Research field of the Department of Horticulture and Sciences, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The area is situated on the south of Prayagraj on the right bank of Yamuna at Rewa road at a distance of about 6 km from Prayagraj city. It is situated at the 0.8□N Latitudeand 810.50□E meters from sea level. Prayagraj has a sub-tropical climatic with uttermost in summer (in the month of May and June) with temperate reaching around 115□F with hot blazing winds and in winter (December and January the temperature falls down as low as 32□F. The average rainfall is around 1013.4 (mm) annually with maximum concentration duringjuly to septemberwith occasional showers in winters. The experiment was laid out in Randomized Block Design (RBD), 9 varieties of spinach with 3 replication each.

RESULTS AND DISCUSSION

In the present experiment, a research has been done to study the varietial performance of spinach (*Spinacia oleraceae*) at Prayagraj agro-climatic condition. The morphological growth parameters are namely days to germination, plant height (cm), no. of leaves, leaf length (cm), leaf width (cm), and yield parameters namely days to harvest, yield per plant (kg), yield per plot (kg), yield (q/ha), and quality is chlorophyll and economics. The results obtained are shown in table 1, 2 and 3.

1. Growth parameters.

The least number of days to germination was recorded in variety V6 (Perpetual Spinach) followed by V3 (Red kitten Spinach), whereas variety V5 (bloomdale Spinach) took the longest for germination.The maximum plant height was recorded in V6 (Perpetual Spinach) (18.16 cm) followed by V4 (catalina spinach) (17.96 cm) while the lowest plant height was recorded in V5 (Bloomdale Spinach) (15.09 cm). The maximum number of leaves was recorded to be V2 (Space Spinach) followed by V6 (Perpetual Spinach) and the minimum was V5 (Bloomdale Spinach). The maximum leaf width was recorded in V5 (Bloomdale Spinach) (12.09 cm) followed by V6 (Perpetual Spinach) (11.80 cm) whereas the minimum leaf width was recorded in V2 (Space Spinach) (9.72 cm). The maximum leaf length was recorded in V6 (Perpetual Spinach) (16.48 cm) followed by V7 (Indian Summer Spinach) (15.73 cm), whereas the minimum leaf length was recorded in V5 (Bloomdale Spinach) (13.04 cm). Due to urbanization and change in food habits, the demand for salad, soup, etc., for spinach is increasing very fast. The Consumers, as well as

growers, are demanding varieties having good qualities. One of the most important reasons for the low production of spinach in the farmer's field is the lack of knowledge on suitable varieties. Farmers are asking for high-yielding varieties with good-quality of leaves. The growth, yield, and quality performance of the spinach varieties vary from place to place and region to region.

Table 1: Growth parameters of spinach.

Treatment Symbols	Varieties	Days to germination	Plant height (cm)	Number of leaves	Leaf width (cm)	Leaf width (cm)
V^1	All Green	7	17.65	13.00	11.42	15.23
V^2	Space Spinach	7.33	16.62	15.13	9.72	13.90
V^3	Red Kitten Spinach	6	17.46	13.87	11.05	14.37
V^4	Catalina Spinach	8.47	17.96	12.73	10.02	14.68
V^5	Bloomdale Spinach	9	15.09	12.33	11.80	13.04
V^6	Perpetual Spinach	5.93	18.16	14.80	12.09	16.48
V^7	IndianSummer Spinach	8.40	16.37	12.67	11.21	15.73
V^8	Punjab Green	8	16.01	12.53	10.91	13.91
V^9	Corvair Spinach	6.80	15.32	12.73	10.39	14.68

2. Yield and Quality parameters

The least number of days for maturity was recorded in V6 (Perpetual Spinach) (39.67 days) followed by V1 (All Green) (40.67 days), whereas the vartuety that took the longest number of days for maturity was recorded in V5 (Bloomdale Spinach) (47.67 days).The maximum yield per plant (kg) was recorded in V6 (Perpetual Spinach) (0.67kg) followed by V3 (Red Kitten spinach) (0.64kg) while the minimum fresh weight was recorded in V5 (Bloomdale Spinach) (0.46kg).The maximum Yield per plot (kg) and yield (Q/Ha) was obtained in V6 (Perpetual Spinach) (6kg) (66.67 q/ha) followed by V3 (Red Kitten spinach) (5.77 kg) (64.07 q/ha) while the minimum was observed in V5 (Bloomdale Spinach) (4.10 kg) (45.56 q/ha).The maximum chlorophyll content was recorded in V6 (Perpetual Spinach) (20.01) followed by V2 (Space spinach) (23.23) while the minimum fresh weight was recorded in V5 (Bloomdale Spinach) (30.17).

Table 2: Yield and Quality of spinach

Treatment Symbols	Varieties	Days to harvest	Yield per plant (kg)	Yield per plot (kg)	Yield (q/Ha)	Chlorophyll (SPAD)
V^1	All Green	41.67	0.59	5.27	58.52	25.36
V^2	Space Spinach	43.67	0.53	4.73	52.59	23.23
V^3	Red Kitten Spinach	42.67	0.64	5.77	64.92	24.07
V^4	Catalina Spinach	45.33	0.53	4.77	52.92	25.07
V^5	Bloomdale Spinach	47.67	0.46	4.10	45.56	30.17
V^6	Perpetual Spinach	30.67	0.64	6	66.67	24.03
V^7	Indian Summer Spinach	46.67	0.48	4.30	47.78	20.01
V^8	Punjab Green	45.00	0.62	5.60	62.78	24.80
V^9	Corvair Spinach	41.67	0.52	4.90	54.44	24.23

3. Economics in terms of cost-benefit ratio.

Maximum gross return was recorded in V6 (Perpetual Spinach) (Rs 1,66,425/ ha) followed by V3 (Red Kitten spinach) (Rs 1,60,175/ha) while the minimum was recorded in V5 (Bloomdale Spinach) (Rs 1,13,900/ha). Maximum net return was recorded in V6 (Perpetual Spinach) (Rs 98,265/ha) followed by V3 (Red Kitten spinach) (Rs 92,015/ha) while the minimum was recorded in V5 (Bloomdale Spinach) (Rs 45,740/ha). The maximum cost-benefit ratio was recorded in V6 (Perpetual Spinach) (2.4) followed by V3 (Red Kitten spinach) and V8 (Punjab green) both having C.B.R (2.3) while the minimum was recorded in V5 (Bloomdale Spinach) (1.6).

Table 3: Economics in terms of cost-benefit ratio.

Treatment Symbols	Varieties	Yield (q/ha)	Gross return @ Rs.2500/q) (Rs./ha.)	Net return (Rs/ha)	Cost Benefit ratio
V^1	All Green	58.52	146300	78,140	2.1
V^2	Space Spinach	52.59	131475	63,315	1.9
V^3	Red Kitten Spinach	64.07	160175	92,015	2.3
V^4	Catalina Spinach	52.92	132400	64,240	1.9
V^5	Bloomdale Spinach	45.56	113900	45,740	1.6
V^6	Perpetual Spinach	66.67	166425	98,265	2.4
V^7	Indian Summer Spinach	47.78	119450	51,290	1.7
V^8	Punjab Green	62.78	156950	88,790	2.3
V^9	Corvair Spinach	54.44	136100	67,940	1.9

CONCLUSION

Based on this present research, it was concluded that the Variety V6 (Perpetual Spinach) was found to be the most suitable over all the other varieties in relation to growth and yield and Quality of Spinach. Similarly, the Variety V6 (Perpetual Spinach) showed highest BC ratio (2.4)

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