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Performance of Fenugreek (*Trigonella foenum-graecum*) and Spinach (*Spinacia oleracea* L.), Varieties Under Shade Net Condition in Villupuram District of Tamil Nadu

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ABSTRACT

The field study was conducted to assess the performance of fenugreek and Spinach varieties for leaf purpose under shade net condition in Villupuram district of Tamil Nadu during 2023. In this study, fenugreek variety Ajmer fenugreek 5 and Spinach variety Arka Anupama along with local cultivars were evaluated under 50 % green agro shade net house. The earlier and uniform germination was observed in Ajmer fenugreek 5 (4.33 days) and Arka Anupama (6.80d) compared to local cultivar. Ajmer fenugreek 5 and Arka Anupama palak recorded better growth, leaf yield and quality. Ajmer fenugreek 5 recorded significantly higher plant height (21.82 cm) and leaf yield (0.98 kg/m^2). Anupama Spinach recorded significantly higher plant height (30.54 cm) and leaf yield (4.16 kg/m^2).

Key Words: Cost ,Fenugreek, Germination, Herbage yield, Plant height, Spinach.

INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.) is used as green leafy vegetable and micro greens for its medicinal properties. The fenugreek leaves are used for preparing curries with other vegetables, making chapatis, puris and fish curry. Spinach is used as green leafy vegetable for its nutritional properties. The Spinach leaves were used for making curries, palak panner, chapatis, puris and other items. Since both vegetables prefer cool climate, they are cultivated well in open condition during cool weather condition. Because of their soft stem and susceptibility to root rot, they are not recommended for cultivation during rainy season. Cultivation of fenugreek and Spinach is difficult under open condition during summer due to the prevalence of high temperature. During summer, protected structures *viz*., poly house and shade net house are used to improve the yield and quality of leafy vegetables (Dixit *et al*, 2005; Shahak *et al*, 2008; Singh and Choudhary, 2020; Lal *et al*, 2018). Shade net house is one of the best protected and low cost structures for cultivation of fenugreek and Spinach. Production of fenugreek and Spinach is possible under shade net house for cultivation during off season. During summer, lower temperature and light intensity favours better growth of leafy vegetables under shade net condition compared to open field cultivation where higher temperature and light intensity hinders the germination and growth. Keeping these views in mind, the trial was conducted during summer season of 2023 in Villupuram district to study the performance of fenugreek and Spinach varieties under shade net condition.

MATERIALS AND METHODS

The trial was conducted on cultivation of fenugreek and Spinach under shade net condition at Villupuram district, Tamil Nadu, India during 2023. The experiment was laid out in a completely randomized block design with five replications. The land is ploughed inside the shade net house and weeds were removed. The enriched farm yard manure with *Azospirillum, phosphobacteria* and *potash bacteria* was applied into beds and mixed well. The raised beds of 3 feet width were formed. Fenugreek variety Ajmer Fenugreek 5, Spinach variety Arka Anupama and local varieties were taken for this study. Fenugreek variety Ajmer

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Table 1. Performance of fenugreek varieties under shade net condition

Varieties	Days taken for germination	Germination (%)	Plant height (cm)	Herbage yield (kg/m^2)	Herbage yield (kg/200m^2)
Ajmer Fenugreek 5	4.33	91.33	21.82	0.98	194.30
Local	5.46	65.00	10.36	0.61	121.65
Mean	4.90	78.17	16.09	0.80	157.98
SEd	0.36	2.45	1.06	0.11	3.11
CD (p=0.05)	0.71	4.89	2.11	0.23	6.22

Table 2. Cost economics of fenugreek cultivated under shade net condition

Varieties	Gross cost (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)	BCR
Ajmer Fenugreek 5	3,410	7,850	4,440	2.30
Local	3,250	4,840	1,590	1.49

Fenugreek 5 is suitable for leaf production under shade net. Spinach variety Arka Anupama is a multi-cut type, high yielding, late flowering with medium large, dark green, thick and succulent leaves. The fenugreek seeds were soaked in water for 4 hours. The Spinach and fenugreek seeds were treated with *Trichoderma viride* at the rate of 4 g / kg of seed. The treated seeds were dried under shade for 30 minutes. The treated fenugreek and Spinach seeds were sown at a spacing of 15 cm x 5 cm and 20 cm x 10 cm respectively in 50% green agro shade net house during March. The intercultural operations were followed as standard horticultural practices to raise the healthy crop.

The growth and yield parameters viz., days taken for germination, germination percentage, number of branches, plant height and herbage yield were recorded. The data on germination was recorded and subjected to statistical analysis. The gross cost, gross income, net income and BCR were calculated for fenugreek and Spinach. The data were statistically analysed as per the method suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Fenugreek

The growth and yield parameters of fenugreek are presented in Table 1. Seeds were germinated in 4.33 days. The germination percentage was also higher in Ajmer fenugreek 5 (91.33%) compared to local cultivar (65.00%). Harvesting of fenugreek was done after 24 days of sowing. Plant height was higher in fenugreek variety Ajmer fenugreek 5 (21.82 cm). The growth of Ajmer fenugreek 5 was better than local cultivar under shade net condition due to the genetic character of these varieties. The results indicated that growing of fenugreek in shade net house significantly increased leaf yield. The Ajmer fenugreek 5 produced highest leaf yield (0.98 kg/m^2) than local cultivar (0.61 kg/m^2). The higher yield was recorded in fenugreek under shade net condition during summer (Dixit *et al*, 2005; Kotadia *et al*, 2012). This might be due to presence of suitable temperature and light inside shade net house.

Table 3. Performance of Spinach varieties under shade net condition

Varieties	Days taken for germination	Germination (%)	Plant height (cm)	Herbage yield (kg/m^2)	Herbage yield (kg/200m^2)
Spinach Arka Anupama	6.80	89.45	30.54	4.16	410.01
Spinach (Local)	8.15	67.44	16.12	3.08	315.03
Mean	7.48	78.45	23.33	3.62	362.52
SEd	0.88	2.11	1.39	0.40	3.13
CD (p=0.05)	1.78	4.20	2.77	0.79	6.26

Table 4. Cost economics of Spinach cultivated under shade net condition

Varieties	Gross cost (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)	BCR
Spinach Arka Anupama	5,100	16,400	11,300	3.22
Spinach(Local)	8,600	14,050	5,450	1.63

The gross income was higher in Ajmer Fenugreek 5 (Rs.7,850/-) compared to local cultivar (Rs.4,840/-). The net income of Rs.4,440/- was recorded in Ajmer Fenugreek 5 with BCR of 2.30 compared to control with net income of Rs.1,590/- and BCR of 1.49 (Table 2).

Spinach

The growth and yield parameters of Spinach are presented in Table 3. Spinach variety Arka Anupama seeds were germinated earlier (6.80 days) than local cultivar (8.15 days). Harvesting of Spinach was done after 29 days of sowing and subsequently three cuttings at an interval of 15 days. The germination percentage was also higher in Spinach variety Arka Anupama (89.45%) compared to local cultivar (67.44%). Plant height was higher in Spinach variety Arka Anupama (30.54 cm) compared to local cultivar (16.12 cm). The growth of Spinach variety Arka Anupama was better than local cultivar under shade net condition due to the genetic character of these varieties. The results indicated that growing of Spinach in shade net house significantly increased leaf yield. Spinach variety Arka Anupama produced highest leaf yield (4.16 kg/m^2) than local cultivar (3.08 kg/m^2). The yield varied with shade intensity in the protected structure (Dodiya *et al*, 2021). The leaf yield was influenced by sowing time (Singh *et al*, 2013), spacing (Waseem *et al*, 2000), number of cutting (Narayan *et al*, 2018), fertilization (Singh *et al*, 2003) and environmental condition (Dabhi, 2015). The prevalence of suitable temperature and light inside shade net house was also favoured the better growth. Mahajan *et al*, 2017 reported that the leaf yield was higher in coriander var. JD 1 under 50% shade net compared to coriander grown in open condition.

The gross income was higher in Spinach variety Arka Anupama (Rs.16,400/-) compared to local cultivar (Rs.14,050/-). The net income of Rs.11,300/- was recorded in Spinach variety Arka Anupama with BCR of 3.22 compared to control with net income of Rs.5,450/- and BCR of 1.63 (Table 4).

CONCLUSION

The higher yield and net income was obtained from shade net cultivation of fenugreek variety Ajmer fenugreek 5 and Spinach variety Arka Anupama. Fenugreek variety Ajmer

fenugreek 5 and Spinach variety Arka Anupama were found suitable for growing under 50% shade net condition in Villupuram district. Since the demand is increasing for Spinach, fenugreek greens and microgreens, there is a lot of scope for upscaling the fenugreek and Spinach cultivation.

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