The Bioscan 8(1): 131-133, 2013
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.in

PERFORMANCE OF GINGER VAR. HUMNABAD AS INFLUENCED BY PLANTING DATES UNDER NORTHERN DRY ZONE OF KARNATAKA

A. SHADAP*, N. K. HEGDE[1] AND A. PARIARI[2]
Department of Spices and Plantation Crops, BCKV, Mohanpur, Nadia, West Bengal
[1]Department of Spices and Plantation Crops, K. R. C. College of Horticulture, Arabhavi - 591 310
University of Agricultural Sciences, Dharwad, Karnataka
[2]Department of Spices and Plantation Crops, BCKV, Mohanpur, Nadia, West Bengal
e-mail: arwan_s@rediffmail.com

KEYWORDS
Ginger, planting date's germination, yield and quality

Received on :
27.09.2012

Accepted on :
03.01.2013

***Corresponding author**

ABSTRACT
A field experiment was conducted at the Department of Spices and Plantation Crops, K.R.C. College of Horticulture, Arabhavi, Belgaum District (Karnataka) to find out the optimum planting date for better growth, yield and quality in ginger var. Humnabad. Planting in the month of May took significantly lower number of days for germination (20.50). Maximum plant height was recorded in May planting (48.30cm) which was on par with June planting (47.93cm) compared to the minimum in March planting (27.11cm). The number of tillers per clump were higher in June planting (14.25) closely followed by May planting (14.05). May Planting also recorded higher fresh rhizome yield per hectare (17.09t) closely followed by June planting (16.49 t) while the lowest fresh rhizome yield was recorded by August planting (4.98t). Lower per cent disease intensity (*Helminthosporium leaf spot*) was recorded by May planting (22.87%) which was on par with June planting (28.26%) compared to the maximum in March planting (68.96%). Essential oil and oleoresin content was higher in March planting (1.62 and 4.55 % respectively) followed by April planting (1.51 and 4.35 % respectively) and the lowest was recorded by August planting (0.98 and 3.50 % respectively).

INTRODUCTION

Ginger (*Zingiber officinale* Rosc) is one of the important and widely used spices throughout the world. India is the largest producer of ginger in the world and the annual production is about 3.76lakh tonnes from an area of about 1.06L hectares, contributing approximately 30 to 40 per cent of the world production (NHB, 2008). The major producing states are Kerala, Meghalaya, Arunachal Pradesh, Mizoram, Orissa, Sikkim and West Bengal. Planting dates play an important role in the germination, growth, yield and quality in ginger which ultimately decided the yield and quality of rhizomes under different agro-climatic conditions. Planting on 15th May is reported to be optimum for higher yield and good quality ginger under Solan (H.P) conditions (Aggarwal *et al*., 2002). Similar results was also obtained by Bandopadhyay *et al*. (2005) and Kandiannan and Chandaragir (2006) in turmeric that rhizomes planted during May recorded better performance under West Bengal and Coimbatore conditions respectively. Optimum planting dates results in better germination of the crop which put up good growth and eventually increases the yield of ginger.

Studies on planting dates in ginger particularly under northern dry zone of Karnataka are scanty, hence, the present investigation was undertaken to assess the performance of ginger with respect to growth, yield and quality and also on the incidence of *Helminthosporium* leaf spot under different planting dates under Northern dry zone of Karnataka.

MATERIALS AND METHODS

A field experiment was conducted to find out the optimum planting date in ginger var. Humnabad at the experimental field of the Department of Spices and Plantation Crops, Kittur Rani Channamma College of Horticulture, Arabhavi, Gokak taluk, Belgaum district (Karnataka) during 2009-10. The experiment was laid out in randomised block design, replicated four times under the shade of 12 years old coconut plantation. The treatments consisted of 6 planting dates planted at a spacing of 30 x 20cm on raised beds of 3mx1mx15cm size at 2nd fortnight of each month starting from March till August. Farm yard manure @ 25 t/ha was applied to all the beds, before planting the seed rhizome, and mixed well with the soil. The recommended dose of fertilizer (*i.e.,* 100, 50 and 50 kg NPK/ha) was applied. Full dose of phosphorus and potassium were applied as basal dose. Nitrogen was top dressed in equal splits after weeding at 30 days and 60 days of planting. Cultural operations were carried out as per the recommended package of practices. Observations were recorded on germination percentage and growth attributes viz., plant height, number of leaves per clump, number of tillers per clump, leaf area per clump and leaf area index was recorded at 150 days after planting and yield and yield attributing parameters were recorded at harvest. Content of essential oil in fresh rhizome was obtained by steam distillation using Clevenger type apparatus (AOAC, 1975). Similarly oleoresin content in the rhizomes was estimated (Anonymous,

1984). Scoring for the intensity of incidence of *Helminthosporium* leaf spot disease caused by *Helminthosporium maydis* was done at 150 DAP adopting 1 to 5 scales (Singh, 1984). Fisher method of analysis of variance was applied for analysis and interpretation of data (Panse and Sukhatme, 1967).

RESULTS AND DISCUSSION

Planting in the month of May took significantly lower number of days for 1st and 50 per cent germination (20.50 and 25.5 respectively) followed by rhizome planted on June (26.50 and 32.75 respectively) and while the rhizome planted on March took the highest number of days for 1st and 50 per cent germination (35.50 and 45.75 respectively) (Table 1). Under the northern dry zone of Karnataka, climatic condition during March and April was hot and dry as indicated by higher temperature and low relative humidity (RH) which might have prevented the rhizome to initiate sprouting as compared to May planting where optimum temperature and RH were favourable for better sprouting of ginger seed rhizome (Fig. 1). The physiological conditions of rhizome might also have contributed for early and complete germination in a shorter period during May and June. Maximum plant height was recorded in May planting (48.30cm) which was on par with June planting (47.93cm) compared to the minimum in March planting (27.11cm). The pseudostem girth was higher in May planting (2.45cm) which was on par with June planting (2.42cm) and the lowest was in August planting (1.74cm). The number of tillers per clump was higher in June planting (14.25) which was on par with May planting (14.05) compared to the lowest in March planting (9.08). The number of leaves per clump was higher in June planting (301.16) which was on par with May planting (297.20) and March planting recorded the lowest number of leaves per clump (137.51). Planting in the month of June recorded higher LAI (12.64) which was closely followed by May planting (12.45) and the lowest LAI was recorded by March planting (3.50). Similar results were obtained by Aggarwal *et al.* (2002) who reported that planting ginger on 15th May was appropriate under Solan (H.P) conditions. Bandopadhyay *et al.* (2005) also reported the better growth performance of turmeric planted on 1st May under West Bengal conditions. Kandiannan and Chandaragir (2006) also reported that turmeric planted on 15th May resulted in better vegetative growth under Coimbatore conditions.

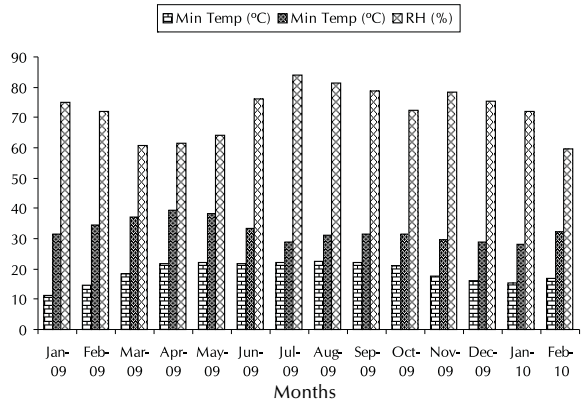

Figure 1: Meteorological data recorded during experimental period (2009-2010) at Agricultural Research Station, Arabhavi

Higher number of rhizome per clump (Table 2) was recorded by May planting (15.50) followed by June planting (14.00)

Table 1: Effect of planting dates on days to 1st and 50 per cent germination and growth attributes at 150 days after planting (DAP) in ginger var. Humnabad

S.No	Planting dates	Days to 1st germination	Days to 50 per cent germination	Plant height (cm)	Pseudostem girth (cm)	No. of tillers per clump	No. of leaves per clump	Leaf area index
T_1	Mar. 2009	35.50	45.75	27.11	2.00	9.08	137.51	3.50
T_2	Apr. 2009	27.75	36.25	37.14	2.06	11.03	206.11	6.01
T_3	May 2009	20.50	25.50	48.30	2.45	14.05	297.20	12.45
T_4	Jun. 2009	26.50	32.75	47.93	2.42	14.25	301.16	12.64
T_5	Jul. 2009	28.25	33.75	35.78	1.99	9.70	178.60	6.26
T_6	Aug. 2009	30.50	35.50	38.13	1.74	9.35	162.27	5.55
S.Em±	0.801	0.985	2.381	0.076	0.873	20.09	0.919	
CD at 5%		2.41	2.97	7.17	0.230	2.629	60.56	2.77
CV (%)	5.69	5.64	12.19	7.23	15.52	18.80	23.76	

Table 2: Effect of planting dates on rhizome attributes, harvest index, fresh rhizome yield, per cent disease intensity (*Helminthosporium* leaf spot) and quality attributes in ginger var. Humnabad

S.no	Planting dates	Rhizome attributes Rhizome (No./clump)	Rhizome Girth (cm)	Harvest index(%)	Fresh rhizome) yield (t/ha	Per cent disease intensity	Quality attributes essential oil (%)	oleoresin (%)
T_1	Mar. 2009	6.50	4.61	59.39	5.35	68.96	1.62 (1.46)	4.55 (2.25)
T_2	Apr. 2009	6.75	5.04	59.86	8.34	55.26	1.51 (1.41)	4.35 (2.20)
T_3	May 2009	15.50	5.74	56.24	17.09	22.87	1.39 (1.37)	4.15 (2.16)
T_4	Jun. 2009	14.00	6.36	63.90	16.49	28.26	1.22 (1.30)	3.95 (2.11)
T_5	July 2009	6.03	4.74	51.70	5.14	45.42	1.14 (1.28)	3.80 (2.07)
T_6	Aug. 2009	5.25	4.67	41.49	4.98	51.13	0.98 (1.21)	3.50 (2.00)
S.Em±	0.79	0.32	3.88	0.55	4.305	0.040	0.025	
CD at 5%	2.40	0.96	11.69	1.66	12.97	0.12	0.08	
CV (%)	17.70	12.22	14.01	11.56	19.00	5.99	2.35	

Figures in parenthesis indicated square root transformed values

compared to the lowest in August planting (5.25). The rhizome girth was higher in June planting (6.36cm) followed by May planting (5.74cm) while the lowest fresh rhizome girth was recorded in March planting (4.61 cm). Higher harvest index was recorded by June planting (63.90) closely followed by April planting (59.86) and March planting (59.39) while the lowest was recorded by August planting (41.49). Planting rhizome in the month of May recorded higher fresh rhizome yield per hectare (17.09t) closely followed by June planting (16.49 t) while the lowest fresh rhizome yield was recorded by August planting (4.98 t). Favourable climatic conditions during May and June under northern dry zone of Karnataka must have contributed for higher yield (Fig. 1). The results of the present investigations are in conformity with those of Aggarwal *et al*. (2002) who reported that planting on 15th May results in higher yield and yield attributes in ginger. Mohanty *et al*. (1990) reported that the yield of ginger planted on 1st April was higher and it decreased when planted during 1st July under Orissa conditions. Mishra *et al*. (1997) and Kandiannan and Chandaragir (2006) also reported similar findings in turmeric.

The minimum per cent disease incidence was recorded by May planting (22.87%) which also recorded the highest yield (17.09t ha^{-1}) and was on par with June planting (28.26%) compared to the maximum PDI recorded in March planting (68.96%) followed by April planting (55.26%). Late planting during July and August also recorded higher PDI (45.42 and 51.53% respectively). Higher growth attributes in the crop planted during May and June might have induced tolerance to leaf spot diseases. Coincidence of peak vegetative growth of the crop planted during March and April with rainfall and higher relative humidity, during monsoon season might have contributed to the higher disease incidence in the crop planted during these months. Late planting resulted in poor vegetative establishment of the crop which probably pre-disposed the crop to the leaf spot disease and environmental conditions being favorable for pathogenic multiplication and spread.

Higher essential oil and oleoresin (non-volatile ether extract) content was recorded by March planting (1.62 and 4.55% respectively) while the lowest was recorded by August planting (0.98 and 3.50% respectively). The quality attributes like essential oil content and oleoresin was higher in the early planting dates and decreases gradually and rhizomes planted during August recorded the lowest values for the content of these quality attributes. However, the total yield of essential oil and oleoresin content on per hectare basis was lesser since the fresh rhizome yield was less in the early planting dates. The higher content of essential oil and oleoresin in the early planting dates might be attributed to the longer crop duration which facilitated accumulation of these contents as the crop took more days for maturity than other planting dates. Aggarwal *et al*. (2002) also reported the increased accumulation of essential oil and oleoresin with increased crop duration in ginger. Goyal and Korla (1997) and Ratnambal *et al*. (1987) have also reported similar results in ginger confirming the increase in the content of essential oil and oleoresin with increased age of the rhizome.

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