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Effect of mulching on plant growth and rhizome yield in ginger (*Zinziber officinale* Rosc.) in rainfed plateaus of Jharkhand

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SUMMARY

Present experiments were conducted in participatory mode on farmers' field. Eight ginger growing farmers of four villages of Garhwa district were selected to grow the crop by application of four types of mulches *viz*., Palas (*Butea monosperma* L.) leaves, Paddy straw, Dried bushes (*Lantana americana, Ocimum americana, Parthenium etc.)*, FYM @ 10 t/ha each along with unmulched control in plots of 20 m^2 area during *kharif*, 2006 and 2007. It is evident from above observations that mulching of ginger with FYM resulted in maximum rhizome yield per plot, width of rhizome, number of tillers per hill, plant height and earliest emergence whereas mulching with *Palas* leaves exhibited maximum rhizome length, numbers of leaves per plants and minimum number of weeds per unit area.

Key words : Mulches, Rhizome, Ginger

Ginger is an important spice crop of Garhwa district of Jharkhand. Farmers generally grow this crop during rainy season under rainfed uplands using locally available planting materials. However, they procure an uneconomical yield because of high input in cultural operations and water stress due to erratic and flush nature of rainfall in growing period. As the rural areas of Garhwa district are adorned with forest trees and bushes which could efficiently be used as mulch materials. Use of agricultural residues, forest litters, bushes and dried grass as mulching material for conservation of soil moisture, suppression of weeds, favourable temperature for plant growth etc. have been reported by many of earlier workers (Isenberg and Obland, 1950; Singh and Gangwar, 1972; Singh *et al.*, 1976; Korla *et al.,* 1990; Gupta and Awasthi, 1997). Besides, plant residues as mulch, black polythene has also exhibited favourable effects on plant growth, weed control and rhizome yield (Korla *et al.,* 1990; Pawar, 1990; Mohanty *et al.*, 1990; Kumar and Korla, 1998). Looking the importance of mulching in sciophytic crops particularly in ginger, these trials were conducted.

MATERIALS AND METHODS

Present experiments were conducted in participatory mode on farmers' field. Eight ginger growing farmers of four villages of Garhwa district were selected to grow the crop by application of four types of mulches *viz.*, Palas (*Butea monosperma* L.) leaves, Paddy straw, Dried bushes (*Lantana americana*, *Ocimum americana*, *Parthenium etc.)*, FYM @ 10 t/ha each along with unmulched control in plots of 20 m^2 area during *kharif*, 2006 and 2007. Seed rhizomes were planted in second fortnight of June at 15 x 15 cm spacing. Mulch materials were applied just after planting the seed rhizome. The experiments were laid out in randomized block design with eight replications. Data were recorded for days to emergence, plant height (cm), number of leaves per plant, number of tillers per hill, number of weeds per unit area (0.25 m^2), rhizome length (cm), width of rhizome (cm) and rhizome yield per plot (kg).

RESULTS AND DISCUSSION

The average data of two years depicted in Table 1 revealed that planting of seed rhizome in June followed by mulching exhibited almost five days earlier emergence as compared to unmulched plots. Minimum days were taken to emergence by mulching with FYM (15.69) followed by at par effects of *Palas* leaves and Paddy straw which were significantly earlier than mulching with dried bushes (18.44 days) and unmulched plots (20.07 days). Regarding vegetative growth of plants, FYM mulch registered maximum effect (43.86 cm) followed by *Palas* leaves (43.12 cm). Maximum number of leaves was recorded in mulching with *Palas* leaves (64.72) followed by FYM and paddy straw with at par effect on number of leaves per plant. Mulching with *Palas* leaves and FYM were also promising treatments of number of tillers per hill (5.56 and 4.84, respectively) with non significant difference. Gupta and Awasthi (1997) had reported

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Table 1: Effect of different mulches on plant growth and rhizome yield in ginger (Average of two years)

Sr. No.	Mulch materials	Days to emergence	Plant height (cm)	Number of leaves per plant	Number of tillers per hill	Number of weeds per unit area	Rhizome length (cm)	Width of rhizome (cm)	Rhizome yield per plot (kg)		
									Ist Year	IInd Year	Mean
1.	Palas leaves	16.82	43.12	64.72	4.84	8.84	11.26	5.90	31.48	33.21	32.35
2.	Paddy straw	17.01	39.83	61.74	4.78	9.42	10.82	5.54	30.75	29.73	30.24
3.	Dried bushes	18.44	40.55	57.52	4.46	10.15	10.13	4.81	26.64	26.79	26.72
4.	FYM	15.69	43.86	63.98	5.56	11.81	11.22	6.12	33.45	33.68	33.57
5.	Unmulched control	20.07	27.07	48.39	3.30	55.97	7.76	4.18	20.48	19.95	20.22
	C.D. (P=0.05)	1.69	2.03	3.25	0.63	2.41	0.88	0.39	1.61	1.36	-

maximum number leaves per plant (76.0), plant height (44.0 cm) and number of tillers per hill (6.86) with *Palas* leaves as mulch material which was comparable to the findings of present investigation. Arandhi and Suryadi (1982) also reported height effect of Paddy straw on vegetative growth of plants in terms of leave area in potato. Minimum numbers of weeds per unit area were recorded in plots mulched with *Palas* leaves (8.84) followed by at par effects of Paddy straw (9.42) and Dried bushes (10.15) as mulch materials. Although, slightly higher number of weeds were noted with FYM mulching as compared to other mulch materials (11.81) but it was quit lower as compared to control plot (55.97). Weed population was proportionate to thickness and extent of shading effect of mulch materials. *Palas* leaves, Paddy straw and Dried bushes had more thickness and higher level of shading effect as compared to FYM mulching where penetration of mulch layer by weeds was comparatively easy.

Rhizome length was found highest with *Palas* leaves as mulch materials (11.22 cm) followed by FYM (11.26 cm) and Paddy straw (10.82 cm). In contrary, width of rhizome and rhizome yield per plot were found highest with FYM *viz*., 6.12 cm and 33.57 kg, respectively followed by at par value with *Palas* leaves. *viz*., 5.90 cm and 32.35 kg, respectively. These findings are in agreements with Korla *et al*. (1990) who reported maximum rhizome yield per plant with mulching of FYM + grass clippings and FYM + Pine needles. However, Gupta and Awasthi (1997) found maximum width of rhizome and rhizome yield per hectare with mulching of *Palas* leaves (80 cm and 21.90 t, respectively).

It is evident from above observations that mulching of ginger with FYM resulted in maximum rhizome yield per plot, width of rhizome, number of tillers per hill, plant height and earliest emergence whereas mulching with *Palas* leaves exhibited maximum rhizome length, numbers of leaves per plant and minimum number of weeds per unit area. Favourable effects of mulching might be due to efficient weed control, maintained porosity and structure of soil which would otherwise be compact due to heavy rains and releasing some nutrients in soil (Wilson and Ovid, 1993). Application of mulch materials increased rhizome yield per plot and vegetative growth of plants (plant height, number of tillers per hill and number of leaves per plant) indicated intact association between source and sink *i.e.* synthesis of large amount of assimilates and increased movement of assimilates (carbohydrates) from vegetative parts *viz*., leaves and pseudostem (source) to rhizome (sink) (Roy and Womanan, 1988; Gupta and Awasthi, 1997). Among different mulch materials, FYM and *Palas* leaves had highest and at par effects on early emergence, plant growth, weed control and rhizome yield characters. Earlier workers also agreed on FYM as good mulch for getting high yield in ginger (Kannan and Nair, 1965; Randhawa and Nandpuri, 1969; Korla *et al*., 1990) however, natural occurrence *Palas* leaves at low input enables it to be more economical for production of ginger under rainfed plateaus of Jharkhand.

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