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Role of different composts and sowing dates on productivity of Gobhisarson (*Brasssica napus* var. oleracea) under organic conditions

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Abstract

A field experiment was conducted in a randomized block design with three replications and ten treatment combinations with an objective to study the "Role of different composts and sowing dates on productivity of Gobhisarson (*Brasssica napus* var. oleracea) under organic conditions" during *rabi* 2008-09 and 2009-10 at the Research Farm of Deptt. of Organic Agriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (H.P), India. The treatments consisted of two sowing dates *viz. Panchang* and *Non-panchang* and six compost treatments *viz.* FYM 15 t/ha, BD compost 5 t/ha, VC 10 t/ha, FYM + VC (50:50), FYM + BD (50:50) and VC + BD (50:50). The soil of the experimental site was silty clay loam in texture, acidic in pH, medium in nitrogen, low in phosphorus and high in potassium. The crop was sown in second week of October during the first year of experimentation. Panchang sowing resulted in significantly higher number of pods/plant, seeds/pod and hence, significantly higher seed yield over Non-panchang sowing during the first year of study *i.e* 2008-09, whereas, during 2009-10 the yield attributes and yield of gobhisarson were not affected significantly due to the Panchang sowing. Pods/plant and seeds/pod were affected significantly due to various composts. Biodynamic compost applied alone and in combination with other composts proved to be the best as campared to the other composts in increasing the yield attributes and yield of gobhisarson.

Keywords: ***composts, gobhisarson, non-panchang, organic, panchang***

Introduction

Rapeseed-mustard oil is an essential dietary component, in India. Its production in India has touched a new height of 6.78 mntonnes in 2011-12 and occupies an area of 5.92 mha with average productivity of 1145 kg/ha (Source: Directorate of Economics and Statistics). In Himachal Pradesh amongst different oilseeds crops, rapeseed-mustard group of crops rank first in acreage, though its productivity is quite low 600 kg/ha (DES, 2000). In India, the Brassica crops occupy the second largest position after groundnut, with 3-5 million hectares, producing about 2 mt of seed annually. *Brassica napus* var oleracea an amphiploid between *Brassica compestris* and *Brassica oleracea* was introduced to India from Europe and Canada. It is a long duration crop confined to Haryana, Punjab, and Himachal Pradesh. It is gaining importance because of its high yield potential, wider adaptability, and suitability for early planting to exploit the residual moisture of Kharif season. There is a lot of scope to grow this crop organically in Himachal Pradesh.

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Gobhisarson is an exhaustive crop and has a high nitrogen requirement (Thakuar and Chand, 1998). Among the rabi oilseed crops, Gobhisarson (*Brassica napus* L.) is an important crop for assured irrigation situations. Brassicas play an important role in the world agriculture as oilseeds, vegetables, forage and fodder, green manure and condiments. It is widely cultivated for the purpose of domestic consumption as well as export of seed meal. Brassica napus L. is the important oilseed crop throughout the world which rank third among the oilseed crops after soybean and oil palm in production of vegetable oils, while fifth in the production of oilseed proteins (Armin *et al*, 2013). This crop accounts for nearly one third of the oil produced in India, making it the country's key edible oilseed crop. It is an introduction from European countries and possess high yielding capacity. The meal that remains after oil extraction has value as a source of protein for the livestock feed industry (Jensen *et al*,1996). Organically for increasing productivity of gobhisarson different composts and biodynamic agriculture (*Panchang* and *Non panchang*) can play very important role. Biodynamic agriculture was the first ecological

farming system to develop as a grassroots alternative to chemical agriculture. Biodynamics has much in common with other organic approaches it emphasizes the use of manures and composts and excludes the use of artificial chemicals on soil and plants. A fundamental tenet of biodynamic agriculture is that food raised biodynamically is nutritionally superior and tastes better than foods produced by conventional methods. Biodynamics can be understood as a combination of "biological dynamic" agriculture practices. Compost is one such tool because it helps to bring life into the soil and the very basis of all organic horticultural methods. Biodynamic compost is a fundamental component of the biodynamic method; it serves as a way to recycle animal manures and organic wastes, stabilize nitrogen, and build soil humus and enhance soil health. Hence, present investigation was undertaken to evaluate the effect of *Panchang* sowing and different composts on productivity of *gobhisarson*.

Material and Methods

A field experiment was conducted during *rabi* 2008-09 and 2009-10 at the Research Farm of Department of Organic Agriculture, Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur at an altitude of 1290.8 metrea.m.s.l with latitude $32^0$6' N and longitude $76^0$3' S.The area represents the mid-hill wet temperate zone of Himachal Pradesh. The soil of the experimental site was silty clay loam in texture, acidic in reaction (pH 5.4), medium in available nitrogen, and low in available phosphorus and high in available potassium. The experiment was laid out in Randomised Block Design with 12 treatment combinations and three replications. The treatments consisted of two sowing dates *viz.Panchang* and *Non-panchang* and six compost treatments *viz.* FYM 15 t/ha, BD compost 5 t/ha, VC 10 t/ha, FYM + VC (50:50), FYM + BD (50:50) and VC + BD (50:50). The crop was sown in the first week of October during all the seasons at row to row spacing of 30 cm and plant to plant spacing of 10 cm. Nadep compost performed poorly almost in all the crops at the Model Organic Farm during the first year and hence, it was dropped during the second year and different combination of FYM, VC and BD were tried in 50:50 ratios. Data were collected on traits such as pods/plant, seeds/pod, number of silique per plant, 1000-seed weight, biological yield and seed yield. Data on plant height, yield attributes and yield were recorded at the time of harvesting.

Results and Discussion

Effect of sowing dates

Biodynamic agriculture is an organic farming system that arose out of a philosophical movement, anthroposophy (Steiner 1974; Kirchmann 1994). Sowing according to the biodynamic calendar (Panchang*)* did not affect the yield attributes and seed yield of gobhisarson significantly. Biodynamics is a way of achieving a balance between soil, water, air, light and warmth. Data were collected on traits such as number of pods per plant, seeds per pod, number of siliqua per plant, 1000-seed weight, seed yield and biological yield. Growth parameters like plant height and primary branches/plant in non panchangbeing at par with Panchang during both the years of experimentation (Fig.1). For dry matter, during first year of study, results were significant for non panchang then panchang but in second year, results were vice versa. It was also found that during both the years final plants population results in panchang being at par with non panchang (Table 1). Canola (*Brassica napus* L.) yield is a function number of pods per plant, number of seeds per pod and 1000 seed weight (Clark and Simpson, 1998).

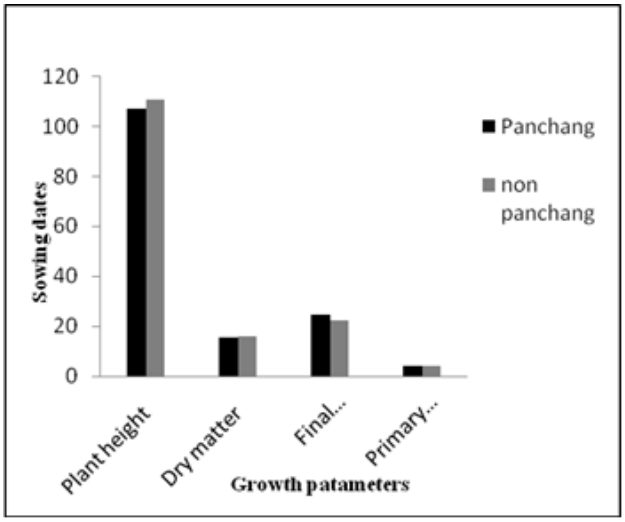

Fig. 1. Effect of sowing dates on growth parameters of gobhisarson.

Table 1 Effect of growth parameters on Gobhisarson

Treatments	Plant height (cm)			Dry matter (g/plant)			Final Plants population/m^2			Primary branches/plant		
Sowing dates	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean
Panchang	106.8	107.6	107.2	13.8	17.6	15.7	23.8	25.1	24.50	4.11	4.19	4.15
Non –Panchang	110.9	111.3	111.1	15.5	16.5	16.0	22.1	22.9	22.50	4.12	4.20	4.16
CD (P=0.05)	NS	NS	NS	1.2	NS	NS	1.2	1.2	1.2	NS	NS	NS
Composts												
FYM 15 t/ha	102.2	102.6	102.4	10.0	14.0	12.0	22.6	24.2	23.40	3.96	4.0	3.98
VC 10 t/ha	110.4	112.8	111.6	14.6	15.8	15.2	23.7	24.5	24.10	4.12	4.18	4.15
BD 5 t/ha	109.8	111.0	110.4	15.2	18.0	16.6	22.3	26.3	24.30	4.21	4.19	4.20
FYM + VC (50:50)	105.6	107.0	106.3	16.5	18.3	17.4	22.7	25.3	24.00	4.15	4.17	4.16
FYM + BD (50:50)	111.6	109.4	110.5	15.0	17.8	16.4	22.9	26.1	24.50	4.15	4.35	4.25
VC + BD (50:50)	113.4	114.2	113.8	16.4	18.4	17.4	23.8	24.8	24.30	4.10	4.30	4.20
CD (P=0.05)	3.9	4.3	4.2	1.4	1.6	1.5	NS	2.0	NS	0.20	0.25	0.24

Yield attributes not significantly affected by sowing dates. During both the years of study, pods/plant was significantly higher for *Non panchang* then in *panchang*. Pods per plant were the most sensitive yield components to water stress (Diepenbrock, 2000). It was found that 1000 seed weight and siliqua length was not strongly or little influenced by sowing dates showing more results for panchang in 2008 but in 2009 results were non significant (Fig. 2).

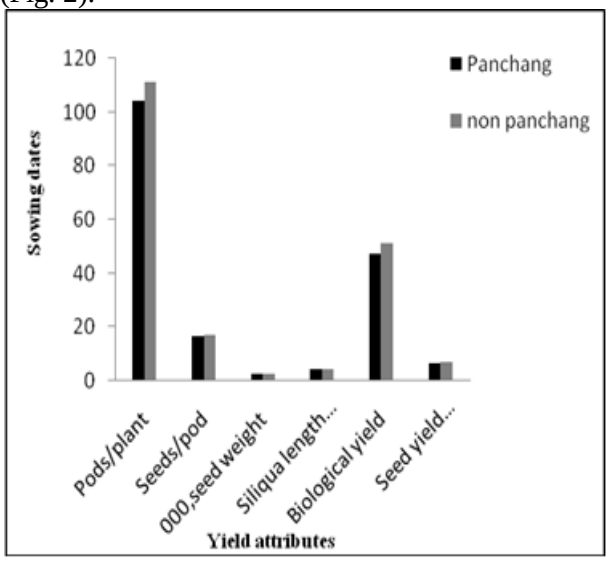

Fig. 2 Effect of sowing dates on yield attributes of gobhisarson

Number of seeds per pod has positive correlation with pods/plant, biological yield and grain yield for non panchang sowing but these factors not significantly affected by sowing dates (Table 2). During both years, seed yield shows significant results for non panchang then in panchang (Fig. 3).

Effect of different composts:

Pods/plant and seeds/pod were affected significantly due to various composts. Biodynamic compost (BD) 5 t/ha being at par with vermicompost 10 t/ha produced significantly higher number of pods/plant and seeds /pod and higher seed yield over FYM 15 t/ha during both the years of study. Among different composts treatments, BD in combination with FYM and VC resulted in significantly higher growth parameters then BD and VC alone. During both the years, plant height found to be maximum for VC + BD followed by FYM + BD and minimum for FYM alone (Table 1). Similar results were found for final plants population in 2008 but in 2009 BD shows maximum results followed by FYM + BD and VC + BD. Dry matter was found to be maximum for FYM + VC and VC + BD and for primary branches/plant results were maximum for BD alone (Fig. 4). VC + BD (50:50) and FYM + BD (50:50) recorded 7.2 and 11.4% higher yield over BD 5 t/ha alone and 63.0 and 69.6% higher yield over FYM 15 t/ha (Standard check). Among various composts, FYM + BD (7.5 t+2.5 t/ha) being at par with VC + BD (5.0 +2.5 t/ha) and BD 5.0 t/ha alone resulted in significantly higher growth parameters of gobhisarson over the remaining treatments (Fig. 5).

Table 2 Effect of yield attributes and yields on Gobhisarson

Treatments	Pods/plant		Seeds/pod		Seed weight		Siliqua length (cm)		Biological yield		Seed yield (q/ha)	
Sowing dates	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**
Panchang	100.2	108.2	16.7	16.9	2.59	2.63	4.47	4.51	45.8	49.0	6.1	6.7
Non–panchang	104.9	117.5	16.6	17.6	2.32	2.84	4.38	4.52	48.2	54.6	6.5	7.3
CD (P=0.05)	NS	8.2	NS	NS	0.12	NS	0.07	NS	NS	NS	NS	0.3
Composts												
FYM15 t/ha	96.3	104.6	12.7	13.5	2.33	2.57	4.28	4.32	44.4	44.4	4.2	5.0
VC 10 t/ha	102.5	116.5	16.2	16.6	2.32	2.80	4.45	4.55	54.8	54.8	6.3	6.7
BD 5 t/ha	105.8	111.0	17.5	18.1	2.56	2.66	4.36	4.54	55.3	55.3	6.4	7.6
FYM + VC (50:50)	101.2	109.4	17.9	18.9	2.59	2.67	4.45	4.55	49.4	49.4	6.3	6.7
FYM + BD (50:50)	107.4	113.6	17.3	17.9	2.35	3.05	4.49	4.59	55.9	55.9	7.2	8.4
VC + BD (50:50)	108.6	118.4	18.4	18.6	2.58	2.68	4.52	4.58	52.1	52.1	7.4	7.6
CD (P=0.05)	4.0	4.3	1.4	1.7	0.22	NS	0.21	0.22	5.8	5.8	1.2	1.3

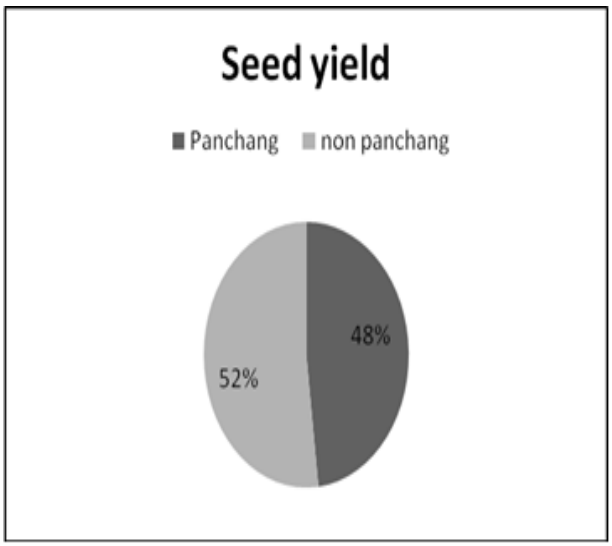

Fig. 3 Effect of sowing dates on yield of gobhisarson

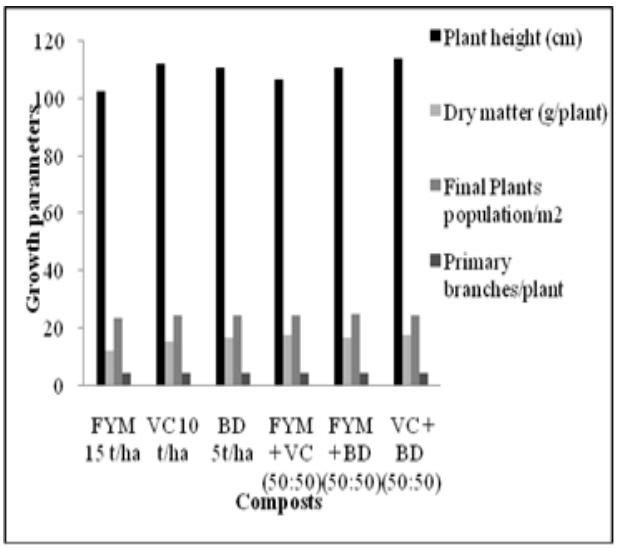

Fig.4 Effect of composts on growth parameters of *gobhisarson*.

For different compost treatments, yield attributes and yield shows similar results as for growth parameters. During both the years, pods/plant was found to be maximum for VC + BD followed by FYM + BD and BD alone (Table 2). Similar results for siliqua length with maximum for VC + BD followed by FYM + BD and FYM + VC. In 2008, seeds/pod was found to be maximum for VC + BD followed by FYM + VC whereas, in 2009 results were vice versa (Table 2). For 000, seed weight results were maximum for FYM + VC in 2008 and FYM + BD in 2009. Parameters like biological yield were maximum in BD alone followed by VC + BD in 2008 whereas in 2009 results were maximum for FYM + BD followed by FYM alone (Fig. 6). FYM + BD (7.5 t + 2.5 t/ha) being at par with VC + BD (5.0 t+2.5 t/ha) and BD 5.0 t/ha resulted in significantly higher yield attributes and seed yield of *gobhisarson* over the remaining treatments. VC + BD and FYM + BD recorded 7.2 and 11.4% higher yield over BD 5 t/ha and 63.0 and 69.6% higher yield over FYM 15 t/ha

(Standard check). 1000-seed weight was not strongly or little influenced by different composts (Fig. 7). About seed yield, results were maximum for VC + BD followed by FYM + BD in 2008 whereas; in 2009 maximum yield was found in FYM + BD followed by VC + BD and BD alone.

As it is shown in pie diagram, seed yield is maximum for FYM + BD (50: 50) followed by VC + BD (50: 50) and BD (50: 50) (Fig. 8).Gobhisarson is high yielding oilseed crop suitable for high fertility conditions (Sharma *et al*, 2012).

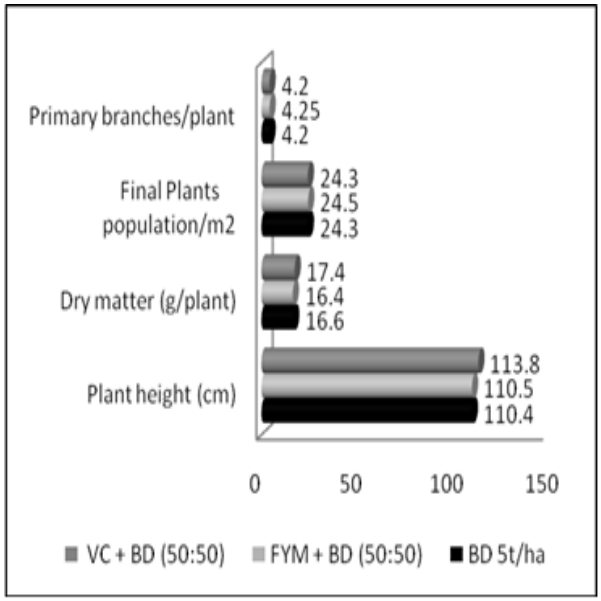

Fig. 5.Comparing effect of VC + BD (50:50), FYM + BD (50:50) and BD alone

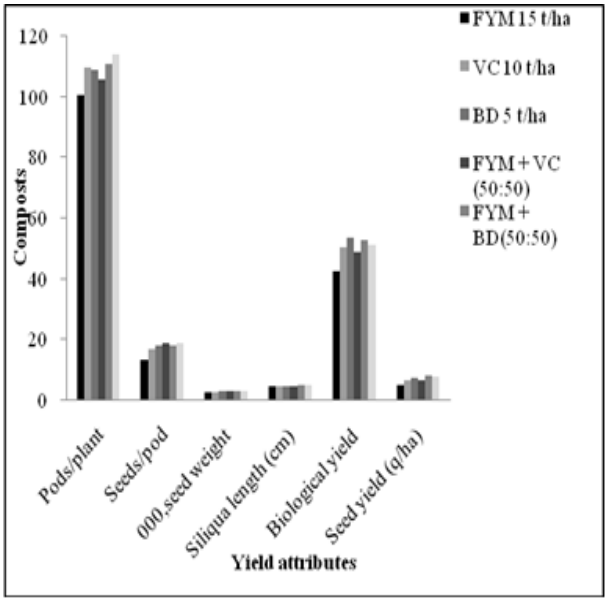

Fig.6. Effect of composts on yield attributes of gobhisarson

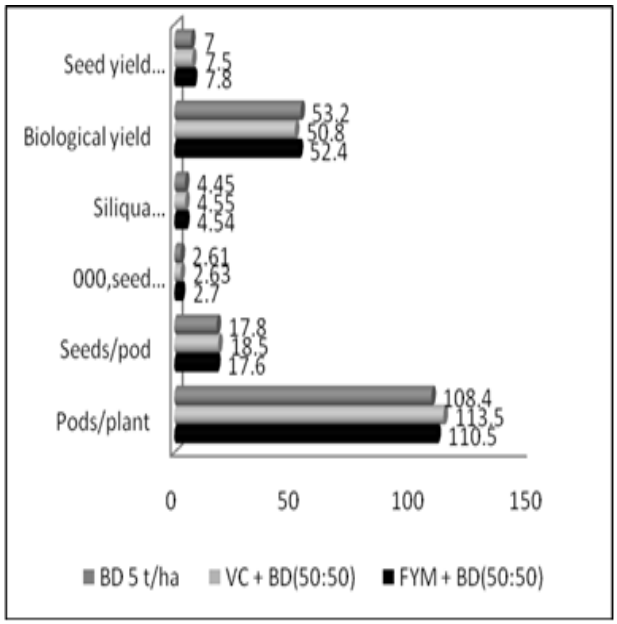

Fig.7 Comparing effect of VC + BD (50:50), FYM + BD (50:50) and BD alone

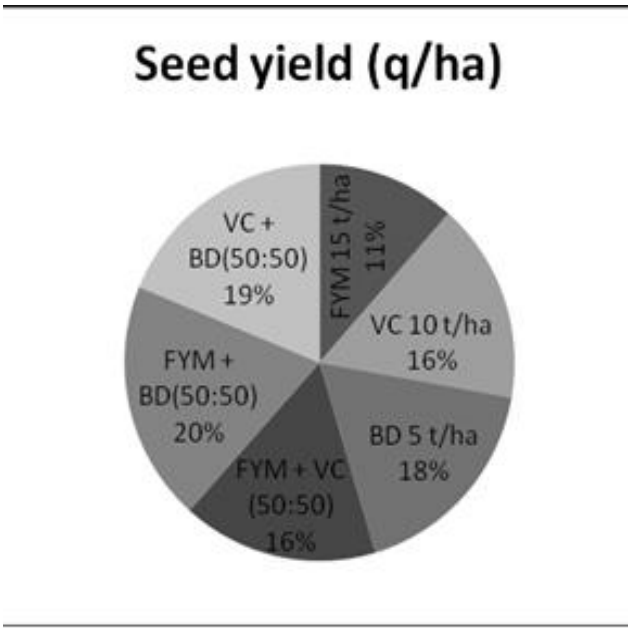

Fig. 8.Effect of composts on seed yield of *gobhisarson*

Conclusion

It can be concluded that sowing according to the biodynamic calendar (*Panchang)* did not affect the growth parameters, yield attributes and seed yield of *gobhisarson* significantly. Whereas in different composts, biodynamic compost applied alone and in combination with other composts (BD + VC and FYM + BD) proved to be the best as compared to the other composts in increasing the yield attributes and yield of *gobhisarson* followed by VC and FYM alone.

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