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Effect of conservation agriculture and organic nutrient management on quality content of soybean: French bean cropping system

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Abstract
A field experiment on "Influence of conservation agriculture and organic nutrient management on soil health and productivity of soybean - French bean cropping system" was conducted at the All India Coordinated Research Project on Integrated Farming Research System, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.) during two consecutive years 2018-19 and 2019-20. The experiment was laid out in split plot design during *kharif* season and split-split plot design during *rabi* season with three replications. Among the tillage practices with crop residue management treatments, protein content (%), oil content (%) and carbohydrate content (%) of soybean and protein content (%) of French bean was observed higher in (T1) conventional tillage with crop residue management. In organic nutrient management, protein content (%), oil content (%) and carbohydrate content (%) of soybean and protein content (%) of French bean was observed significantly higher in (F3 and S3) application of FYM @ 7.5 t ha^{-1}.

Keywords: Soybean-French bean, cropping system, tillage practice etc.

Introduction
Conservation Agriculture is a resource-saving agricultural production system that aims to achieve production intensification and high yields while enhancing the natural resource base through compliance with three interrelated principles i.e. minimum soil disturbance with organic soil cover and diversified crop rotation along with other good production practices of plant nutrition and pest management (Abrol and Sangar, 2006) [1].
In crop residue management, leaving last year's crop residue on the soil surface by limiting tillage. In this management, crop residue on the surface before and during planting operations provides cover for the soil at a critical time of the year. The residue is left on the surface by reducing tillage operations and turning the soil less. Pieces of crop residue shield soil particles from rain and wind until plants can produce a protective canopy. Incorporation of crop residues into soil or retention on the surface has several positive influences on physical, chemical and biological properties of soil (Bhale and Wanjari, 2009) [4].
Soybean (*Glycine max* L. Merill) being a potentially high yielding crop. This plant is classified as oilseed rather than pulse crop as approximately 85% of the world's soybean crop is processed into soybean meal and vegetable oil.
French bean (*Phaseolus vulgaris* L.) is one of the important leguminous crops which achieve its foremost importance in cultivation in the agricultural field due to its higher nutritional index of protein in fresh pods (1.7%) as well as in dried seeds (21.1%) that serve as a cheap source of higher protein.

Materials and Methods
A field experiment on "Influence of conservation agriculture and organic nutrient management on soil health and productivity of soybean - French bean cropping system" was conducted at the All India Coordinated Research Project on Integrated Farming Research System, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.) during two consecutive years 2018-19 and 2019-20.

The experiment was laid out in split plot design during *kharif* season and split-split plot design during *rabi* season with three replications. The treatment consists of four main plot treatments of tillage practices with crop residue management *viz*., T1- Conventional tillage with crop residue, T2 - Conventional tillage without crop residue, T3 - Minimum tillage with crop residue, T4- Minimum tillage without crop residue and two sub plot treatments of organic nutrient management *viz*., F1 - 0 (Control), F2 - FYM 5 t ha^{-1}, F3 - FYM 7.5 t ha^{-1} for kharif soybean. During rabi season the main and sub plot treatments remains same but the sub plot treatments were divided into three sub plot treatment of organic nutrient management *viz*., S1 - 0 (Control), S2 - FYM 5 t ha^{-1}, S3 - FYM 7.5 t ha^{-1} to French bean crop as a sub-sub plot treatment. Observation was recorded protein content (%), oil content (%) and carbohydrate content (%) of soybean and protein content (%) of French bean. The data was analyzed using ANOVA (Analysis of variance) table.

Results and Discussion

Soybean

Effect of tillage practices with crop residue management on protein content (%): Protein content (%) of soybean was observed higher in (T_1) conventional tillage with crop residue management and non significantly influenced by different tillage practices with crop residue management during both the year of experiment. Similarly, tillage practices with crop residue management minimum tillage without crop residue (T4) showed lower protein content (%) of soybean than other treatments during both the years of experiment. These results are in accordance with the findings of Jat *et al.* (2016) [7].

Effect organic nutrient management on protein content (%): Protein content (%) of soybean was observed higher in (F_3) application of FYM @7.5 t ha^{-1} than other treatments of organic nutrient management and non significantly influenced by different organic nutrient management treatments. Similarly, organic nutrient management 0 control (F1) showed lower protein content (%) of soybean than other treatments during both the years of experiment. These results are in close proximity to those reported by Aziz *et al*. (2018) [2].

Effect of tillage practices with crop residue management on oil content (%): Oil content (%) of soybean was observed higher in (T_1) conventional tillage with crop residue management and non significantly influenced by different tillage practices with crop residue management during both the year of experiment. Similarly, tillage practices with crop residue management minimum tillage without crop residue (T4) showed lower oil content (%) of soybean than other treatments during both the years of experiment. These results are in accordance with the findings of Sessiz and Sogut (2008) [8].

Effect organic nutrient management on oil content (%): Oil content (%) of soybean was observed higher in (F_3) application of FYM @7.5 t ha^{-1} than other treatments of organic nutrient management and non significantly influenced by different organic nutrient management treatments. Similarly, organic nutrient management 0 control (F1) showed lower oil content (%) of soybean than other treatments during both the years of experiment. These results are in close proximity to those reported by Bonde and Gawande (2017) [5].

Effect of tillage practices with crop residue management on carbohydrate content (%): Carbohydrate content (%) of soybean was observed higher in (T_1) conventional tillage with crop residue management and non significantly influenced by different tillage practices with crop residue management during both the year of experiment. Similarly, tillage practices with crop residue management minimum tillage without crop residue (T4) showed lower carbohydrate content (%) of soybean than other treatments during both the years of experiment. These results are in accordance with the findings of Jat *et al.* (2016) [7].

Effect organic nutrient management on carbohydrate content (%): Carbohydrate content (%) of soybean was observed higher in (F_3) application of FYM @7.5 t ha^{-1} than other treatments of organic nutrient management and non significantly influenced by different organic nutrient management treatments. Similarly, organic nutrient management 0 control (F1) showed lower carbohydrate content (%) of soybean than other treatments during both the years of experiment. These results are in close proximity to those reported by Ghodke *et al*. (2018) [6].

Table 1: Effect of tillage practices with crop residue management and organic nutrient management on protein content (%), oil content (%) and carbohydrate content (%) of soybean during 2018-19 and pooled.

Treatment	Protein content (%)			Oil content (%)			Carbohydrate (%)		
	2018	2019	pooled	2018	2019	pooled	2018	2019	pooled
Main plot: Tillage practices with crop residue management (T)									
T_1 - Conventional tillage with crop residue	27.68	28.00	27.84	15.80	16.24	16.02	12.82	13.23	13.03
T_2 - Conventional tillage without crop residue	25.64	25.73	25.69	14.68	15.04	14.86	11.89	12.22	12.06
T_3 - Minimum tillage with crop residue	26.57	26.80	26.68	15.26	15.65	15.46	12.37	12.74	12.55
T_4 - Minimum tillage without crop residue	24.61	24.60	24.61	14.03	14.33	14.18	11.35	11.63	11.49
SE (m) ±	2.04	2.15	1.48	0.43	0.54	0.35	0.60	0.64	0.44
C.D. at 5%	NS	NS	NS	NS	NS	1.07	NS	NS	NS
Sub plot: Organic nutrient management (F)									
F_1 - 0 (control)	25.41	25.66	25.53	14.73	15.10	14.92	11.65	12.00	11.83
F_2 - FYM 5.0 t ha^{-1}	26.11	26.28	26.20	14.95	15.31	15.13	12.10	12.45	12.28
F_3 - FYM 7.5 t ha^{-1}	26.85	26.91	26.88	15.16	15.53	15.34	12.57	12.92	12.74
S.E. (m) ±	1.72	1.62	1.18	0.51	0.49	0.35	0.51	0.60	0.39
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interactions (T x F)									
Between two sub plots means at same level of main plot means									
SE (m) ±	3.45	3.24	2.36	1.03	0.97	0.71	1.03	1.19	0.79
C.D. at 5%	NS	NS	6.81	3.09	NS	2.04	NS	NS	2.27
Between two main plots means at same level of sub plot means									
SE (m) ±	3.48	3.41	2.43	0.95	0.96	0.67	1.03	1.16	0.78
C.D. at 5%	NS	NS	7.19	2.93	NS	1.98	NS	NS	2.29
General mean	26.13	26.28	26.20	14.95	15.31	15.13	12.11	12.46	12.28

Frenchbean

Effect of tillage practices with crop residue management on protein content (%): Protein content (%) of Frenchbean was observed higher in (T_1) conventional tillage with crop residue management and non significantly influenced by different tillage practices with crop residue management during both the year of experiment. Similarly, tillage practices with crop residue management minimum tillage without crop residue (T4) showed lower protein content (%) of Frenchbean than other treatments during both the years of experiment. These results are in accordance with the findings of Sessiz and Sogut (2008) [8].

Effect organic nutrient management on protein content (%): Protein content (%) of French bean was observed higher in (F_3) application of FYM @7.5 t ha^{-1} than other treatments of organic nutrient management and non significantly influenced by different organic nutrient management treatments. Similarly, organic nutrient management 0 control (F1) showed lower protein content (%) of French bean than other treatments during both the years of experiment. These results are in close proximity to those reported by Aziz *et al*. (2018) [2].

Effect organic nutrient management (*R*abi French bean) on protein content (%): Protein content (%) of French bean was observed higher in (S_3) application of FYM @7.5 t ha^{-1} than other treatments of organic nutrient management and non significantly influenced by different organic nutrient management treatments. Similarly, organic nutrient management 0 control (S1) showed lower protein content (%) of French bean than other treatments during both the years of experiment. These results are in close proximity to those reported by Bachham *et al*. (1996) [3].

Table 2: Effect of tillage practices with crop residue management and organic nutrient management on protein content (%) of French bean during 2018-19 and pooled.

Treatment	Protein content (%)		
	2018-19	2019-20	Pooled
Main plot: Tillage practices with crop residue management (T)			
T_1 - Conventional tillage with crop residue	22.81	24.04	23.43
T_2 - Conventional tillage without crop residue	21.17	22.47	21.82
T_3 - Minimum tillage with crop residue	21.76	22.94	22.35
T_4 - Minimum tillage without crop residue	20.02	20.66	20.34
SE (m) ±	0.85	0.70	0.96
C.D. at 5%	NS	NS	NS
Sub plot: Organic nutrient management (F)			
F_1 - 0 (control)	20.69	21.59	21.14
F_2 - FYM 5.0 t ha^{-1}	21.65	22.87	22.26
F_3 - FYM 7.5 t ha^{-1}	21.98	23.13	22.56
S.E. (m) ±	0.65	0.55	0.74
C.D. at 5%	NS	NS	NS
Sub-sub plot treatment: Organic nutrient management- For *rabi* French bean (S)			
S_1 - 0 (control)	21.22	22.05	21.63
S_2 - FYM 5.0 t ha^{-1}	21.25	22.69	21.97
S_3 - FYM 7.5 t ha^{-1}	21.85	22.84	22.34
S.E. (m) ±	0.20	0.25	0.28
C.D. at 5%	NS	NS	NS
Interactions			
T x F			
SE (m) ±	1.30	1.10	1.47
C.D. at 5%	NS	NS	NS
T x S			
SE (m) ±	0.41	0.51	0.56
C.D. at 5%	NS	NS	NS
F x S			
SE (m) ±	0.35	0.44	0.49
C.D. at 5%	NS	NS	NS
T x F x S			
SE (m) ±	0.71	0.88	0.98
C.D. at 5%	NS	NS	NS
General mean	21.44	22.53	21.98

Conclusion

Among the different treatments of tillage practices with crop residue management and organic nutrient management, conventional tillage with crop residue and application of FYM @7.5 t ha^{-1} was found superior for Soybean-French bean cropping system during both the year of experiment (2018-19).

References

1. Abrol IP, Sangar S. Sustaining Indian agriculture—conservation agriculture the way forward. *Curr Sci*. 2006;91(8):1020-5.
2. Aziz MA, Panotra N, Mushtaq T, Mushtaq T, Islam T. Farm yard manure and dal weed improve the growth and yield in soybean (*Glycine max* (L.) Merrill). J Pharmacogn Phytochem. 2018;7(2):1532-7.
3. Bachham PR, Sabale RN. Effect of different sources of N on growth parameters, yield and quality of soybean. J Maharashtra Agric Univ. 1996;21(2):224-7.
4. Bhale VM, Wanjari SS. Conservation agriculture: A new paradigm to increase resource use efficiency. Indian J Agron. 2009;54(2):167-77.
5. Bonde AS, Gawande SN. Effect of integrated nutrient

management on soil properties and yield of soybean (*Glycine max*). Ann Plant Soil Res. 2017;19(2):205-9.
6. Ghodke PD, Takankhar VG, Madane AJ. Influence of INM on nutrient uptake and quality of soybean in black cotton soil of Maharashtra. Int J Chem Stud. 2018;6(4):267-71.
7. Jat HS, Kumar SP, Khokhar, Jat ML. Conservation agriculture based sustainable intensification of scented rice-wheat rotation in NW India. In: Proceedings of the 4th International Agronomy Congress on Agronomy for Sustainable Management of Natural Resources, Environment, Energy and Livelihood Security to Achieve Zero Hunger Challenge; 2016 Nov 22-26; New Delhi, India. New Delhi: ICAR-IARI; 2016;2:1073-4.
8. Sessiz A, Sogut T. Tillage effects on sunflower (*Helianthus annuus* L.) emergence, yield, quality, and fuel consumption in double cropping system. J Cent Eur Agric. 2008;9(4):697-710.