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Research Article

YIELD GAP AND CONSTRAINTS IN ADOPTION OF SOYBEAN PRODUCTION TECHNOLOGIES IN CENTRAL NARMADA VALLEY AGRO-CLIMATIC ZONE OF MADHYA PRADESH

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Abstract- A study was conducted to find out the yield gap, adoption pattern, and constraints in adoption of soybean production technologies. The primary data were collected from 98 farmers selected on the basis of yield levels, as high, moderate and low from the Central Narmada Valley agro-climatic zone of Madhya Pradesh. The study revealed that at overall yield level Gap-I, II, and III were found to be 52.20, 52.96 and 77.09 per cent, respectively. More than 60 per cent of respondents were not adopting intercropping, land leveling, irrigation management, plant protection, seed treatment, and nutrient management due to various constraints such as lack of capital, high cost, lack of knowledge etc. In both one tail and two tail test deep ploughing, harrowing and land levelling was positive and significant, while irrigation management was negative and significant.

Keywords- Yield gap, Adoption pattern, Constraints, Soybean.

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Introduction

Improved agricultural practices are the products of modern science and technology. Development of new technologies is generally not major problem in our country, the main problem as it exists today is that of an acceptance of these techniques by the farmers. Though soybean is assuming prime importance in oilseed and pulse crop among the farming community, there exists a wide gap between average yield of common farmers and actual potential of the crop. This demands urgent attention to the problems encountered by farmers. Keeping in view the low yield of soybean at farmers level, it was realized to know the level of knowledge and adoption of soybean with respect to production technology [1].

Development and improvement of new technologies is one of the challenges in current research on agriculture. This development is mainly related to agricultural machines in order to evaluate or increase their efficiency under different conditions [2-4].

Transfer of new agricultural technology is necessary for farmer in an usable form. But it has been observed that the dissemination of the new farm technology is limited amongst the farmers and ultimately result in low yield. Transfer of new technology is very important to increase the agricultural production. Although a large number of research have been done but not all of them have been adopted by the farmers. It results in a wide gap between the available knowledge and its adoption. Lack of knowledge and use of less productive technology by the farmers to a great extent reflected in low yield. In India is in increasing order of oilseed production, but the fact remains that even a significant number of farmers are not using the recommended soybean production technologies[5].

India is the fifth major soybean growing country in the world. Soybean is a major *kharif* (monsoon season) oilseed crop grown by the farmers of Madhya Pradesh, the 'Soy State'. This golden bean of 21st century is successfully being grown by the farmers of this "Soy State" since its resurrection in India during late sixties. This venture not only revolutionized the socio-economic status of soybean farmers but also provided them with an apt cropping system of soybean-wheat/chickpea as soybean occupied monsoon fallows in initial years of its establishment [6].

India's soybean yield has recorded a 21.70 per cent growth during 2014 at 959 kg per hectare as compared 788 kg per hectare during kharif 2013 [7]. The production of Soybean in India has increased at a CAGR of 9.60 per cent from 6.87 million tonnes in 2004-05 to 15.68 million tonnes in 2012-13. On the other hand Soybean meal consumption has also increased at a CAGR of 10.82 per cent over the last eleven years from 1365 thousand million tonnes in 2004-05 to 4225 thousand million tonnes in 2014-15. Therefore, to keep pace with the increasing demand it is imperative to increase the productivity of Soybean in the country [8].

Madhya Pradesh produces 54% of the total production of soybean in the country. The other soya producing states are Maharashtra, Rajasthan and Uttar Pradesh. In the remaining states, soybean production is negligible. The western and north-western parts of Madhya Pradesh are major soybean producing areas. Comparatively, eastern and southern parts of Madhya Pradesh produce very little of it. Madhya Pradesh is a leading state of India in terms of area and production of oilseeds and recognized as Soya State in the country. It becomes possible only due to the serious efforts made by the scientists and the government resulting into tremendous increase in oilseed production. Amongst different major oilseeds cultivated in Madhya Pradesh the total area covered in soybean was found maximum (79.10%). In Madhya Pradesh the area under soybean cultivation during Kharif 2014 was 55.46 lac hectares. The production during *Kharif* 2014 was 60.25 lac MT(SOPA 2014 [7].The adoption of an improved technology often results in higher productivity as well as production of a crop. Efficient transfer and implementation of improve technology depends on various factors, which influence yield of the soybean. The soybean scientists claimed that they have developed a very good package of practices for soybean production technology to harvest good yield, but farmers were not able to harness its full potential. Hence, this study was undertaken to examine the yield gap, adoption pattern of soybean

production technologies, and constraints of technologies in Central Narmada Valley agro-climatic zone of Madhya Pradesh with following specific objectives:

1. To analyse the yield gap and adoption pattern of soybean production.
2. To identify the best soybean production technologies.
3. To identify the constraints in adoption of soybean production technology.

Materials and Methods

For this study, Central Narmada Valley agro-climatic zone was selected, under this zone there are three (Harda, Hosangabad, and Narsinghpur) districts were selected out of four districts. These districts covered maximum acreage in soybean. A representative block of the selected district was selected on the basis of maximum acreage under soybean. From selected block a cluster of three villages were selected having the sizable area under soybean. From each selected cluster of these villages, the list of farmers was prepared on the basic of yield level as high (5 Soybean growers), moderate (10 Soybean growers) and low (15 Soybean growers). Thus, ultimate sampling frame consist of 30 high yield soybean growers, 41 mid yield soybean growers and 27 low yield soybean growers constituting a total of 98 soybean growers. From the selected farmers, information was collected with the help of pre-tested interview schedule. The following estimation tools were utilized for addressing the stated objectives:

Estimation of Yield Gap: The YG-I, YG-II, and YG-III were analysed as following formulae:

- **Yield Gap (YG)– I**

$$\text{YG- I (Per cent)} = \frac{Y_P - Y_d}{Y_P} \times 100$$

- **Yield Gap (YG)– II**

$$\text{YG- II (Per cent)} = \frac{Y_d - Y_a}{Y_d} \times 100$$

- **Total Yield Gap (TYG): -**

$$\text{TYG (Per cent)} = \frac{Y_p - Y_a}{Y_P} \times 100$$

- **Index of Realized Potential Yield (IRPY): -**

$$\text{IRPY} = \frac{Y_a}{Y_p} \times 100$$

- **Index of Realized Potential Farm Yield (IRPFY): -**

$$\text{IRPFY} = \frac{Y_a}{Y_d} \times 100$$

Where,

Y_p= Potential Yield

Y_d= Potential Farm Yield

Y_a= Actual Yield

The adoption of technology in the production of soybean, were also identified and their effects were assessed by using z-test statistics for comparing two population mean analysis of following form:

$$Z = \frac{(\bar{x_1} - \bar{x_2})}{\sqrt{\left[\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right]}}$$

Where,

Z follow a standard normal distribution

$\bar{x_1} and \bar{x_2}$ = Mean

$s_1^2 \text{and} s_2^2$ = Standard deviation of first and second population

$n_1 and n_2$= Sample size of first and second population

Results and Discussion

Yield Gap

The magnitude of YG-I, II and III in soybean are presented in [Table-1]. It was observed from data that at overall level the potential farm yield and actual yield was found to be 14.17 and 6.79 q/ha respectively, potential yield was 29.64 q/ha. The average YG-I was found to be 52.20 per cent due to non-adoption of soybean technologies in the study area. It implied that the farmers did not adopt the soybean production technology due to non-transferable components of technology like quality inputs used, cultural practices, etc.

Table-1 *YG at various level of adoption*

Particulars	High yield	Mid yield	Low yield	Overall
Potential yield (q/ha)	30	30	30	30
Potential farm yield (q/ha)	20	15	8	14
Actual farm yield (q/ha)	11	6	4	7
YG-I (Per cent)	33	51	73	52
YG-II (Per cent)	48	57	54	53
YG-III (Per cent)	65	79	88	77
Index of Realized Potential Yield (IRPY) (Per cent)	35	21	12	23
Index of Realized Potential Farm Yield (IRPFY)(Per cent)	53	43	46	47

YG-II was found to be 53 per cent, which was due to various constraints presents in the study area. It showed that the farmers did not adopt the recommended package of practices due to several socio-economical, biological and cultural constraints. Magnitude of total YG (gap-III) was worked out to be 77 per cent. The adoption gap was found to be 36 percent which influenced yield up to 48 Per cent with the potential yield of soybeanas reported by Sharma *et al.* (2006) [9]. The overall Index of realized potential yield was estimated as 23 per cent and realized potential farm yield was 47 per cent.

Adoption Pattern and Constraints in Adoption of Soybean Production Technologies

Field preparation:

Deep ploughing

Adoption pattern and constraints related to deep ploughing are presented in [Table-2]. The data shows that 81 per cent of soybean growers adopted the deep ploughing in the study area. Other soybean growers were not adopted the deep ploughing due to high cost (63 percent), no effect of yield (11 per cent), costly labour (11 percent), lack of time (11 percent) and lack of knowledge (11 percent) etc.

Table-2 *Adoption pattern and constraints related to deep ploughing*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	26 (87)	34 (83)	19 (70)	79 (81)
Non-adopters (No.)	4(13)	7 (17)	8 (30)	19 (19)
Constraints:				
No effect on yield	2(50)	0(0)	0(0)	2(11)
High cost	3(75)	3(43)	6(75)	12(63)
Costly labour	0(0)	0(0)	2(25)	2(11)
Lack of time	0(0)	0(0)	2(25)	2(11)
Lack of knowledge	0(0)	0(0)	2(25)	2(11)

Figures in parentheses are indicating per cent share in total.

Harrowing

Adoption and constraints related to field preparation using harrowing technology are presented in [Table-3].

Table-3 *Adoption pattern and constraints related to harrowing*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	29(97)	35(85)	21(78)	85(87)
Non-adopters (No.)	1(3)	6(15)	6(22)	13(13)
Constraints:				
No effect on yield	1(100)	1(17)	0(0)	2(15)
High cost	0(0)	5(83)	6(100)	11(85)
Costly labour	0(0)	0(0)	2(33)	2(15)
Lack of time	0(0)	0(0)	2(33)	2(15)
Lack of knowledge	0(0)	0(0)	2(33)	2(15)

Figures in parentheses are indicating per cent share in total.

The data indicate that the 87 percentage soybean growers adopted recommended number of harrowing. Others soybean growers were not adopted recommended number of harrowing due to high cost (85 percent), no effect on yield (15per cent), costly labour (15 percent), lack of time (15 percent), and lack of knowledge (15 per cent).

Land levelling

It is clear from the [Table-4] that the 52 percent soybean growers were adopted the land leveling, while on the others hand 48 percentage soybean growers not adopted the land leveling due to no effects on yield, high cost, costly labour, lack of time, lack of knowledge and others as reported by 55, 28, 11, 6, 2 and 6 per cent, soybean growers respectively.

Table-4 *Adoption pattern and constraints related to land leveling*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	20 (67)	22 (54)	9 (33)	51 (52)
Non-adopters (No.)	10 (33)	19 (46)	18 (67)	47 (48)
Constraints:				
No effect on yield	8 (80)	10 (53)	8 (44)	26 (55)
High cost	1 (10)	6 (32)	6 (33)	13 (28)
Costly labour	1 (10)	1 (5)	3 (17)	5 (11)
Lack of time	2 (20)	0 (0)	1 (6)	3 (6)
Lack of knowledge	0 (0)	0 (0)	1 (6)	1 (2)
Other	0 (0)	0 (0)	3 (17)	3 (6)

Figures in parentheses are indicating per cent share in total.

The leveling plays as significant role as for as production of soybean is concerned because in a well leveled field the chance of stagnation of water becomes minimum and as a result of good aeration and soil temperature it leads to better productivity of soybean.

Seed Treatment before Sowing

Adoption pattern and constraints related to seed treatment technology are presented in [Table-5]. The data showed that the recommended seed treatment technology was adopted by 44 per cent of soybean growers in the study area.

Table-5 *Adoption pattern and constraints related to seed treatment before sowing*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	17(57)	18(44)	6(22)	41(42)
Non-adopters (No.)	13(43)	23(56)	21(78)	57(58)
Constraints				
No effect on yield, germination ratio, pest and disease	3(23)	2(9)	0(0)	5(9)
High cost	4(31)	8(35)	9(43)	21(37)
Costly labour	0(0)	1(4)	1(5)	2(4)
Lack of time	0(0)	2(9)	1(5)	3(5)
Lack of knowledge	5(38)	9 (39)	14 (67)	28 (49)
Non availability of chemicals	1(8)	2 (9)	3 (14)	6 (11)
Other	0(0)	0(0)	2(10)	2(4)

Figures in parentheses are indicating percent share in total.

The constraints for adopting the seed treatment before sowing as reported by soybean growers were found to be lack of knowledge (49 percent), high cost (37 percent), non-availability of chemicals (11 percent), no effect of yield, germination ratio, pest and disease (9 per cent),lack of time (5 percent), costly labour (4 percent)and others (4 percent).

Intercropping

None of farmers were not adopting intercropping in soybean due to various constraints such as lack of suitable implements (33), lack of suitable varieties of crops for intercrop (24 percent), costly labour (16 percent), higher cost and weed (11 percent), only soybean yield is needed (11 percent), pest and disease (10 per cent), lower yield (8 per cent) and other (11 percent) [Table-6].

Table-6 *Adoption pattern and constraints related to intercropping*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters	1 (3)	0 (0)	0 (0)	1 (1)
Non-adopters	29 (97)	41 (100)	27 (100)	97 (99)
Constraints:				
Lower yield	1 (3)	4 (10)	3 (11)	8 (8)
Higher cost	2 (7)	4 (10)	5 (19)	11 (11)
Costly labour	5 (17)	5 (12)	6 (22)	16 (16)
Pest and disease	1 (3)	4 (10)	5 (19)	10 (10)
Weed	1 (3)	6 (15)	4 (15)	11 (11)
Only soybean yield is needed	3 (10)	4 (10)	4 (15)	11 (11)
Lack of suitable implements	8 (28)	17 (41)	7 (26)	32 (33)
Lack of suitable varieties of intercrop	8 (28)	7 (17)	8 (30)	23 (24)
Other(Harvestingproblem)	2 (7)	5 (12)	4 (15)	11 (11)

Figures in parentheses are indicating percent share in total.

Manure and soil treatment

Forty per cent respondents were found to adopt manure and soil treatment in their fields [Table-7], while 60 per cent soybean growers not adopted due to lack of time (76 percent), high cost (17 percent), no effect on yield (12 per cent), lack of farm produce manure (3 percent) and others (7 per cent).

Table-7 *Adoption pattern and constraints related to manure and soil treatment*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	18 (60)	15 (37)	6 (22)	39 (40)
Non-adopters (No.)	12 (40)	26 (63)	21 (78)	59 (60)
Constraints				
No effect on yield	1 (8)	3 (12)	3 (14)	7 (12)
High cost	2 (17)	4 (15)	4 (19)	10 (17)
Lack of time	9 (75)	19 (73)	17 (81)	45 (76)
Lack of farm produce manure	0 (0)	0 (0)	2 (10)	2 (3)
Other	2 (17)	2 (8)	0 (0)	4 (7)

Figures in parentheses are indicating per cent share in total.

Application of micro nutrients

The micronutrients application in soybean is very important, more than 98 per cent soybean growers were not adopting micro nutrients.

These cultivators were not in position to use the recommended doses of micro nutrient in the fields due to lack of knowledge (38 per cent), lack of capital (23per cent), high cost of fertilizers (24per cent), no requirement (20per cent), lack of availability of required brands (8), others (2per cent) [Table-8].

Drainage of excess water

Seventy-three per cent of soybean growers follow the drainage of excess water for cultivation of soybean in the study area [Table-9]. Twenty-seven per cent soybean growers were not in position to follow this system due to no sever moisture problem (69 per cent), lack of implements (15 per cent), lack of time (12 per cent) and non-working field condition (12 per cent).

Table-8 *Adoption pattern and constraints related to micro nutrients*

Zinc Sulphate ($ZnSo_4$)	High Yield	Mid Yield	Low Yield	Over all
Total	30	41	27	98
Adopters (No.)	3 (10)	1 (2)	2 (7)	6 (6)
Non-adopters (No.)	27 (90)	40 (98)	25 (93)	92 (94)
Gypsum (CaSO4)				
Adopters (No.)	1 (3)	0 (0)	1 (4)	2 (2)
Non-adopters (No.)	29 (97)	41 (100)	26 (96)	96 (98)
Soil application of bio-fertilizer				
Adopters (No.)	1 (3)	0 (0)	0 (0)	1 (1)
Non-adopters (No.)	29 (97)	41 (100)	27 (100)	97 (99)
Application of any growth hormones or other growth regulators				
Adopters (No.)	0 (0)	0 (0)	0 (0)	0 (0)
Non-adopters (No.)	30 (100)	41 (100)	27 (100)	98 (100)
Constraints				
Total	30	41	27	98
Lack of knowledge	9 (30)	11 (27)	17 (63)	37 (38)
Lack of capital	7 (23)	7 (17)	9 (33)	23 (23)
Lack of availability of required brands	2 (7)	1(2)	5 (19)	8 (8)
No requirement	8 (27)	7 (17)	5 (19)	20 (20)
High cost of fertilizers	6 (20)	13 (32)	5 (19)	24 (24)
Other	0 (0)	2 (5)	0 (0)	2 (2)

Figures in parentheses are indicating per cent share in total.

Table-9 *Adoption pattern and constraints related to drainage of excess water*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	26 (87)	27 (66)	19 (70)	72 (73)
Non-adopters (No.)	4 (13)	14 (34)	8 (30)	26 (27)
Constraints				
No severe moisture problem	3 (75)	9 (64)	6 (75)	18 (69)
Lack of implements	1 (25)	2 (14)	1 (13)	4 (15)
Lack of knowledge	0 (0)	0 (0)	1 (13)	1 (4)
Lack of time	0 (0)	1 (7)	2 (25)	3 (12)
Non-working field condition	0 (0)	1 (7)	2 (25)	3 (12)

Figures in parentheses are indicating per cent share in total.

Irrigation Management

Only 41 per cent of soybean growers adopted the irrigation management in the study area [Table-10].

Table-10 *Adoption pattern and constraints related to irrigation management*

Particulars	High Yield	Mid Yield	Low Yield	Over all
Total	30	41	27	98
Adopters (No.)	15 (50)	14 (34)	11 (41)	40 (41)
Non-adopters (No.)	15 (50)	27 (66)	16 (59)	58 (59)
Constraints				
No severe moisture problem	10 (67)	19 (70)	11 (69)	40 (69)
Lack of knowledge	0 (0)	2 (7)	0 (0)	2 (3)
Non-working condition of irrigation sources	2 (13)	1 (4)	1 (6)	4 (7)
Others	4 (27)	5 (19)	5 (31)	14 (24)

Figures in parentheses are indicating per cent share in total.

While 59 per cent soybean growers were not adopted this technology due to no severe moisture problem (69 per cent), lack of knowledge (3 per cent) and non-working condition of irrigation sources during kharif season (7per cent) and others (24 per cent).

Pest and Disease Control by Chemical

Seventeen per cent soybean growers not used chemical control of pest and disease in the study area. On the other hand, 30 per cent of soybean growers not used chemical control of pest and disease due to high cost (69per cent), lack of knowledge(14 per cent),chemical not available (7per cent) and others (10 per cent) [Table-11].

Table-11 *Adoption pattern and constraints related to pest and disease control by chemical*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	22 (73)	31 (76)	16 (59)	69 (70)
Non-adopters (No.)	8 (27)	10 (24)	11 (41)	29 (30)
Constraints				
High cost	5 (63)	7 (70)	8 (73)	20 (69)
Chemical not available	1 (13)	1 (10)	0 (0)	2 (7)
Lack of knowledge	2 (25)	1 (10)	1 (9)	4 (14)
Others	0 (00)	1 (10)	2 (18)	3 (10)

Figures in parentheses are indicating percent share in total.

Weed control by chemical

As regards to weed control by chemical in soybean, 79 per cent respondents used chemical for weed control, while 21 per cent soybean growers were not in position to control weed in soybean due to high cost (57 percent), lack of time (19 percent), non-availability of chemical (14 percent), lack of knowledge (14 percent), harmful to human (5 percent), harmful to useful insect (5 percent) and others (10 percent) [Table-12].

Mean difference test between adoption (A) and non-adoption (B) of technologies:

An attempt was also made to find out the best technology by using mean difference test [Table-13]. Deep ploughing (5.33), harrowing(3.52) and land levelling (7.31) were positive and significant in both one tail and two tail test, it means these technologies performed better for soybean growers in production of higher yield. While irrigation management (-2.41) was found to be negative and highly significant because of flood irrigation in soybean cause higher infection of diseases

Table-12 *Adoption pattern and constraints related to chemical weed control*

Particulars	High Yield	Mid Yield	Low Yield	Overall
Total	30	41	27	98
Adopters (No.)	24 (80)	33 (80)	20 (74)	77 (79)
Non-adopters (No.)	6 (20)	8 (20)	7 (26)	21 (21)
Constraints				
High cost	3 (50)	5 (63)	4 (57)	12 (57)
Lack of time	0 (0)	1 (13)	3 (43)	4 (19)
Non-available of chemical	0 (0)	1 (13)	2 (29)	3 (14)
Harmful to human	0 (0)	0 (0)	1 (14)	1 (5)
Harmful to useful insect	0 (0)	0 (0)	1 (14)	1 (5)
Lack of knowledge	1 (17)	0 (0)	2 (29)	3 (14)
Others	0 (0)	1 (13)	1 (14)	2 (10)

Figures in parentheses are indicating percent share in total.

Table-13 (a) *Means differences between technologies in adopters and non-adopters soybean growers*

Particulars	Deep Ploughing		Harrowing		Land Leveling		Manuring andSoil		Seed treatment Before Sowing		ZnSO4	
	A	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
Mean	7.51	3.83	7.26	3.77	9.36	4.01	6.37	7.07	6.41	7.07	13.17	6.38
Known Variance	22.47	3.61	21.11	9.52	22.41	4.46	17.63	23.16	21.08	20.91	22.56	18.019
Observations	79	19	85	13	51	47	39	59	41	57	6	92
Hypothesized Mean Difference	0		0		0		0		0		0	
z	5.339		3.521		7.315		-0.762		-0.694		0.481	
P(Z<=z) one-tail	0.000*		0.000*		0.000*		0.223		0.244		0.315	
z Critical one-tail	1.645		1.645		1.645		1.645		1.645		1.645	
P(Z<=z) two-tail	0.000*		0.000*		0.000*		0.446		0.488		0.631	
z Critical two-tail	1.960		1.960		1.960		1.960		1.960		1.960	

Table-13 (b) *Means differences between technologies in adopters and non-adopters soybean growers*

Particulars	Gypsum		Chemical control		Adopting Drainage		Irrigation management		Disease control	
	A	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
Mean	14	6.643	7.010	6	7.017	6.173	5.669	7.707	6.725	6.964
Known Variance	72	19.44	20.81	21.3	19.43	25.25	10.34	27.53	20.15	23.44
Observations	2	96	77	21	72	26	43	58	70	28
Hypothesized Mean Difference	0		0		0		0		0	
z	1.223		0.891		0.758		-2.410		-0.226	
P(Z<=z) one-tail	0.111		0.186		0.224		0.008*		0.411	
z Critical one-tail	1.645		1.645		1.645		1.645		1.645	
P(Z<=z) two-tail	0.221		0.373		0.449		0.016*		0.822	
z Critical two-tail	1.960		1.960		1.960		1.960		1.960	

*Significant at 1 Percent level,

Conclusions

This study revealed that soybean growers faced various constraints in adoption of soybean technologies in Central Narmada Valley agro-climatic zone of Madhya Pradesh. The results show the YG-I of 52.20 per cent due to non-adoption of soybean technologies in the area. YG-II was 52.96 per cent and as a result on an average YG-III was observed to be 77.09 percent at overall level in the area under study.

The index of realized potential yield and realized potential farm yield were found to be 22.91 and 47.04 per cent, respectively. It shows that there is huge gap of 77 per cent exist as for as harnessing the potential is concerned. The sincere efforts of a capacity building and transfer of technology through extension agencies are needed to fulfill this gap. This will insure efficient utilization of resources to meet out the goal of self-sufficiency. Deep ploughing, harrowing and land levelling was found to be positive and significant in both one tail and two tail test, while irrigation management was negative and significant.

It shows that concentrated efforts are required for preparation of land as well as proper care should be taken in managing the irrigation water for harnessing the potential in a fullest manner to benefit the farming community on long term and sustainable basis. Proper field preparation, irrigation management and timely sowing were found to be very crucial for getting higher productivity. Since soybean is a crop, which cannot withstand during long dry spell as well as waterlogged conditions. Districts of Central Narmada Valley fall under the command area. Therefore irrigation management should be given top priority along with drainage of excess water.

Conflict of Interest: None declared

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