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Adoption gap and yield gap in soybean cultivation in Akola district

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Abstract

The present study was conducted in Akola district of Maharashtra state using an exploratory research design to assess the extent of adoption, adoption gap and yield gap cultivation practices. A total of 150 soybean growers were selected from fifteen villages in Akola district, and data were collected using a structured interview schedule. Despite the availability of scientific recommended practices for soybean cultivation, a substantial gap was observed between the recommended practices and those actually adopted by farmers, resulting in lower productivity and high yield gap. The adoption gap and yield gap was calculated for each recommended practice using standard formulas. The results revealed that a significant adoption gap was observed in several recommended cultivation practices such as FYM application, seed treatment, fertilizer application and pest and disease management. These results highlight the need for targeted extension efforts, such as training programs, field demonstrations and timely input support to minimize the adoption gap and improve the adoption of scientific practices and enhance soybean productivity.

Keywords: Adoption, adoption gap, yield gap, recommended cultivation practices

Introduction

The present study was framed with objective

1. To study the adoption gap in soybean cultivation

Methodology

An exploratory research design of social research was used in the present investigation. The sample was drawn from Akola taluka, Murtijapur taluka and Barshitakli taluka of Akola district of Maharashtra state on the basis of having the highest area under soybean cultivation. In recent years a noticeable yield gap has been observed in soybean crop which may be due to the non-adoption of recommended cultivation practices by farmers. Therefore, to assess the adoption gap, Akola district was purposively selected for the study. Total 15 villages were selected purposively from Akola, Murtijapur and Barshitakli taluka and 10 farmers were drawn from each village thus in total 150 farmers constituted the sample size for the study. Data were collected through personal interviews using a pre-tested and structured interview schedule. The collected data were tabulated and analyzed using appropriate statistical tools such as mean, percentage and standard deviation for drawing meaningful interpretations and conclusions.

The adoption gap for each recommended practice was calculated using the following formula

$$\text{Adoption Gap Index} = \frac{R - A}{R} \times 100$$

Where,

R = Maximum obtainable score of the recommended practices

A = Adopted score of the practices

The yield gap is calculated using the following formula

$$\text{Yield Gap Index} = \frac{R - O}{R} \times 100$$

R = Average yield(as per recommendation)

O = Average actual yield obtained to the farmer

Results and Discussion

Adoption gap

Adoption gap refers to the difference between the recommended cultivation practices and the actually adopted practices followed by farmers in the field. The extent to which soybean growers have not implemented the

recommended cultivation practices is referred to as the adoption gap. This section presents the results of the data analysis related to the gap in adoption of recommended practices by soybean growers, as reported in Table 1.

Table 1: Distribution of respondents according to their practice wise adoption gap of recommended cultivation practices of soybean.

Sr. No.	Practice wise adoption gap in recommended soybean cultivation	Adoption gap (%)
1.	**Selection of Soil** Well drained and fertile loam soil	20.00
2.	**Preparatory tillage** Ploughing – one deep ploughing Harrowing- two to three harrowing	23.00
3.	**Varieties** PDKV Amba Suvarna Soya PDKV Purva PDKV Purva PDKV Yellow Gold JS 335 JS – 20 -116 KDS 726 JS -20-34 KDS 992 JS – 93-05 MAUS 612 MAUS 158 KDS- 753 MACS -1520 MAUS -162 MAUS - 725	0.00
4.	**Seed rate** (65 – 75 kg/ha)	27.00
5.	**Spacing** (45 × 10 cm)	25.00
6.	**Depth of sowing** (3 to 4 cm)	30.00
7.	**Seed treatment** Protection from fungal diseases – Before sowing treat seed with @ 3 gm Carboxin 37.5% + Thiram 37.5% DAS (mixture) (Vitavax powder) or Penflufen 13.28% + Trifloxystrobin 13.28% (Evergol) 1 mili or Thiophanate methyl + Pyraclostrobin (Xelora) @ 2.5 to 3 gm per seed	54.00
8.	**Sowing Time** 15th June to 15th July	18.00
9.	**Interculture Operation** 1. Hoeing 1st hoeing – 15 to 20 days after sowing 2nd hoeing if necessary.	38.00
10.	**Intercropping** Tur + Soybean (1:2) Soybean + Sorghum + Tur (6:2:1) Soybean + Sorghum + Tur (9:2:1) Cotton + Soybean (1:1) Cotton + Soybean (1:2)	30.00
11.	**Fertilizer application** (30: 60:30 NPK /ha)	55.00
12.	**FYM Application** (5 tone/ha)	54.00
13.	**Control of Pest** Stem fly – Thiamethoxam 30 FS 10 mili per kilo seed treatment Soybean Girdle Beetle – Profenophos 50 EC 20 mili or Thiacloprid 15 mili. Hairy Caterpillar – Dusting of Carbaryl or Quinolphos @ 25- 30 kh/ha White fly- Spray crops with insecticides like Imidacloprid.	45.00
14.	**Control of Diseases** Charcol rot – Treat seeds with a fungicide like T. viridian, P. Fluorescens, Thiram. Yellow mosaic Virus – Use yellow sticky traps. Rhizoctonia Aerial Blight – Treat with fungicide like Azoxystrobin, Flutolanil. Pod Blight – Use seed applied fungicide or seed treatment with Thiram, Captan, or Carbendazim.	49.00
15.	**Harvesting** Drying & yellowing of leaves Brown colour of pods	14.00

From Table no. 1, the adoption gap for soil selection was 20.00 per cent**.** However, a small proportion awareness or access to suitable land which needs to be addressed through soil health cards and advisory services. In preparatory tillage**,** a 23.00 per cent adoption gap was recorded suggesting that while many respondents perform basic land preparation, a significant portion may skip deep ploughing or adequate harrowing due to labour or equipment constraints. There was no adoption gap in varietal selection**,** which is a highly positive outcome. This shows that all respondents are fully aware for using recommended soybean varieties. The seed rate practice showed a 27.00 per cent gap**.** More training is needed on appropriate seed rates based on row spacing and seed size. In case of spacing 25.00 per cent of adoption gap was observed. The depth of sowing had a 30.00 per cent adoption gap**.** Regarding seed treatment, more than 54.00 per cent of respondents not adopting it. This is a serious concern since untreated seeds are more vulnerable to seed-borne diseases. In case of sowing time**,** the adoption gap was 18.00 per cent, indicating that the majority of respondents sow within the recommended period. Intercultural operations showed a high 38.00 per cent adoption gap. In case of intercropping, 30.00 per cent adoption gap was found, it is a beneficial practice for risk minimization and income diversification. Fertilizer application had the adoption gap of 55.00 per cent**,** showing that nearly half of the respondents are not applying fertilizers as recommended. This is a point of concern. In contrast, FYM (farmyard manure) application again showed a very high adoption gap of 54.00 per cent**,** which matches the gap in seed treatment and fertilizer application. It is possibly due to non availability of required FYM to the farmer. Pest control had an adoption gap o**f** 45.00 per cent, meaning nearly half of the respondents are not following proper pest management practices. The control of diseases showed a 49.00 per cent adoption gap**,** which is among the highest gaps observed regarding the practices. Many respondents are either unaware of disease symptoms or lack access to effective control methods. Finally, the harvesting stage showed a relatively low adoption gap of 14.00 per cent**,** indicating that most respondents follow recommended practices and time of harvesting, minimizing post-harvest losses.

Table 2: Distribution of respondents according to their overall adoption gap in recommended soybean cultivation practices

Sr. No	Adoption gap	Respondents (n = 150)	
		Frequency	Percentage
1.	Low (Up to 28.66)	21	14.00
2.	Medium (28.67 to 48)	102	68.00
3.	High (Above 48)	27	18.00
Total		150	100.00

Mean=38.33 SD=9.67

Table 2 revealed that, 68.00 per cent of respondents had medium level of adoption gap, it was followed by 18.00 per cent respondents had high level of adoption gap and 14.00 per cent respondent had low level of adoption gap in soybean cultivation.

Yield gap

The yield gap is defined as the gap in between the average potential yield of the crop/variety at the research station and the actual yield obtained to the farmers in q/ha.

Table 3: Distribution of respondents according to their overall yield gap in soybean cultivation

Sr. No	Yield gap	Respondents (n = 150)	
		Frequency	Percentage
1.	Low (Up to 60.38)	23	15.33
2.	Medium (60.39 to 69.44)	122	81.33
3.	High (Above 69.44)	05	3.34
Total		150	100.00

Mean=64.91 SD=4.52

From Table 3 revealed that, majority (81.33%) of soybean growers had medium level of yield gap, it was followed by 15.33 per cent soybean growers had low level of yield gap and only 3.34 per cent soybean growers had high level of yield gap in soybean cultivation.

Conclusion

It is concluded that maximum (68.00%) of soybean growers had medium level of adoption gap. A significant adoption gap exists particularly in several recommended cultivation practices like FYM application, seed treatment, fertilizer application, pest and disease management and intercultural operations. Also a considerable yield gap (81.33%) across soybean varieties were observed.

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