RESEARCH **A**RTICLE :

Knowledge and adoption of production technology by ajwain growers

■ **G.B. MORE*, S.U. MOKHALE** AND **N.J. CHIKHALE**

SUMMARY : The present research study was conducted on 100 ajwain growers from 10 villages comprising 5 villages each from Akot and Telhara tahasils of Akola district of Vidarbha region of Maharashtra state to ascertain the knowledge possessed and adoption level of farmers about recommended cultivation practices of ajwain. The result revealed that near about cent per cent of respondents had high knowledge of cultivation practices recommended for ajwain likewise; soil type, seed rate and sowing type, sowing time, spacing, weed management and intercultural operation, time of harvesting and stage of harvesting whereas minimum knowledge about recommended varieties (27.0%), seed treatment (17.0%), plant protection (33.0%), fertilizer application (13.0%). Likewise, majority of respondent (85.0%) were included under medium level of adoption. As regard to finding of relational analysis revealed that out of ten characteristics studied age, education, area under ajwain crop, irrigation facilities, social participation, sources of information and scientific orientation, were positively and significantly correlated with knowledge and adoption. Likewise, land holding was positively and significantly correlated only with knowledge and non-significantly correlated with adoption. Whereas, annual income was non-significantly correlated with both knowledge and adoption.

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BACKGROUND AND **O**BJECTIVES

India is one of the richest floristic regions of the world and is well-known for its ancient heritage regarding medicinal plant and plant drugs. India has 16 agro-climatic zones, 45000 different plant species, out of which 15,000 are medicinal plants. The Indian system of medicine has identified 1,500 medicinal plants, out of which 500 species are mostly used in preparation of drugs (Meena *et al.,* 2009). Another use of seed spices are for flavoring, seasoning and imparting aroma in variety of food items and beverages. There are about 20 seed spices grown in India, therefore, India is known as 'land of spices'. The seed spices classified in two categories *i.e.* major seed spices and minor seed spices according to that ajwain under the minor categories. From

south Indian ajwain fruits, almost pure thymol has been isolated (98%), but the leaf oil was found to be composition of monoterpenoids and sesquiterpenoids (43%) cadinene, (11%) longifolene, (5%) thymol, (3%) camphor and others. The main cultivation areas today are Persia and India as well as Iran, Afghanistan, Iraq. In India, the estimated area under the medicinal crops is around two lakh hectare out of that area under ajwain crop was 15380 ha with the production of 9350 tons. The current productivity of ajwain crop is 619 kg/ha. (Meena *et al*., 2009). It is widely cultivated in Rajasthan and Gujarat state.

In Maharashtra, apart from the Kokan area, seed spices are not commercially grown, in the Vidarbha region of Maharashtra and especially in the salt tract of Akola district (Akot and Telhara

tahasil). As per the estimate of state department of agriculture, it is more than 1410.80 hectare in Vidarbha with the average productivity of 10-12 quintal per hectare. As far as the soil and climate of Vidarbha region is concerned, cultivation of ajwain have a potential to increase the area.

RESOURCES AND METHODS

An exploratory design of social research was used for the present investigation. There are seven Tahasil in Akola district out of them Akot and Telhara tahasil was purposively selected for the study on the basis of maximum area under the ajwain cultivation and farmers experience.

A sample of 100 ajwain growers was selected randomly from the ten villages of two tahasil. The farmers who were having experience since three year or more than three years of ajwain cultivation were taken into consideration. Thus, 10 villages were selected on the basis of maximum number of ajwain growers; five villages from each tehsils were purposively selected.The data was collected by personally interviewing.

OBSERVATIONS AND ANALYSIS

The result obtained from the present investigation has been discussed in the following sub head :

Knowledge index :

The distribution of respondent according to level of knowledge in Table 1 indicates that near about cent per cent (99.0%) majority of the farmers possessed high level of knowledge about ajwain cultivation practices. Medium level had only (1.0 %) and low category belongs to zero level of knowledge.

The above findings are in line with the observations of Singh (2005); Harish *et al.* (2011).

Practice wise knowledge about recommended ajwain cultivation practices :

It is evident from the distribution in Table 2 that, near cent per cent farmers had knowledge about soil type followed by knowledge about recommended varieties of ajwain for sowing (27.0 %), seed rate and type of sowing (91.00 %), very less per cent farmer had knowledge about the seed treatment (17.0 %), cent per cent farmer had the knowledge

about the sowing time and it play an important role in increasing the yield (100 %), spacing (88.0 %), very less farmer had knowledge about the recommended doze fertilizer application (13.0 %), irrigation requirement/schedule (22.0 %), weed management/ intercultural operation that is manually weeding and hoeing (67.0 %), plant protection like pest control and diseases control occurrence of aphids, powdery mildew and their control measure (33.0 %). Harvesting and stage of harvesting knowledge was 99.0 per cent farmers, maximum farmer achieved the recommended yield of ajwain crop on their field through proper use of packages of practices.

Relational analysis :

In order to find out the relationship of the selected characteristics of the respondents with their knowledge, correlation co-efficients were worked out. The results obtained from the relational analysis have been presented as below.

Co-efficient of correlation :

It is observed from the Table 3 that, among selected variables age, education, area under ajwain crop were positively and significantly correlated with adoption at 0.01 level of probability. Whereas, economic motivation and sources of information positively and significantly correlated with adoption at 0.05 level of probability. It is also observed that annual income and land holding has non-significant correlation with the adoption.

The above findings are in line with the observations of Singh (2005, 2007), Harish *et al.* (2011).

Adoption index :

The distribution of respondent according to level of adoption in Table 4 reveals that majority of the farmers (85.00 %) were included under medium category of adoption of ajwain cultivation practices. Whereas, (7.00 % and 8.00 %) low and high adoption category, respectively.

Similar, findings were reported by Desai *et al.* (2000); Singh (2005) and Ganeshprasad *et al.* (2010).

Relational analysis :

In order to find out the relationship of the selected characteristics of the respondents with their adoption, correlation co-efficients were worked out. The results obtained

Table 1 : Distribution of the farmers according to their knowledge level about recommended cultivation practices of ajwain

Sr. No.	Category	Farmers	
		Frequency	Percentage
1.	Low	0	00
2.	Medium	1	1.00
3.	High	99	99.00
	Total	100	100

from the relational analysis have been presented as below.

Co-efficient of correlation :

It is observed from the Table 5 that among selected variables age, education, area under ajwain crop, irrigation facilities, social participation, and scientific orientation were positively and significantly correlated with adoption at 0.01 level of probability. Whereas, economic motivation and

Table 2 : Distribution of the farmers according to practicewise knowledge of recommended cultivation practices

Sr. No.	Recommended cultivation practices	Respondent (n = 100)	
		Number	Percentage
1.	Soil type: (Well drain, heavy to medium avoid sandy soil)	98	98.0
2.	Varieties: recommended (AA-01-19) or (Local, RA-1-80, AA-09-61, GA-01)	27	27.0
3.	Seed rate and type of sowing: By seed drilling method 2.5 to 3.5 kg /ha. By dibbling method 1.5 to 2 kg/ha.	91	91.0
4.	Seed treatment: Use of azotobactor It should be treated with bavistinie or Captan or Thiram @ 2.0 – 2.5 gm/kg	17	17.0
5.	Sowing time: from the first week of Oct. to last week of Nov.	100	100
6.	Spacing: For row to row 60 – 90cm. by seed drilling For ridged and furrow 45 x 45 by dibbling.	88	88.0
7.	Fertilizer application: (40:20:00 NPK nitrogen in split dose i.e.30 DAS) as well as soil testing report of fertility status.	13	13.0
8.	Irrigation Schedule / protected irrigation: (In rainfed condition mainly at the time of flowering time means 70 – 85 DAS. Protected irrigation is required. In irrigated production system about 5 irrigation are required depending on climate and soil type at the interval of 15 – 25 days.)	22	22.0
9.	Weed management / Intercultural operation: (A total of 2-3 manual weeding and hoeing are required, first weeding 30 DAS and then as per required. As well as weed can also be controlled by a preemenrgence application of spraying pendimethaline @ 1kg/ha after sowing.)	67	67.0
10.	Plant protection: Pest control: (Aphids:- Spray Diamethoate 30 EC 10ml/10 lt. of water) Diseases control: (Powdery mildew:- Dusting with sulphur 20 – 25 kg/ha Or spraying wetablekarather/ sulphur (0.1%) twice at flowering stage at 15 days interval.	33	33.0
11.	Harvesting: (It mature 160 -180 DAS. At maturity, flowering seed begin develop and become brown in umbles. Harvested with manually, threshed to separate the fruits by beating with sticks)	99	99.0
12.	Yield: Under rainfed condition 6-7 q/h. and under irrigated condition 10-12 q/h.	87	87.0

Table 3 : Co-efficient of correlation of characteristics of the respondents with their knowledge

Sr. No.	Variables	'r' values	't' value
1.	Age	0.0774**	3.89
2.	Education	0.0143**	4.59
3.	Annual income	0.1288 NS	1.28
4.	Land holding	0.2564*	2.62
5.	Area under ajwain crop	0.4592**	5.11
6.	Irrigation facilities	0.2257*	2.29
7.	Social participation	0.2765*	2.84
8.	Economic motivation	0.2665*	2.73
9.	Sources of information	0.2573*	2.63
10.	Scientific orientation	0.2137*	2.16

* and ** indicates of significance values at P=0.05 and P=0.01, respectively; NS = Non-significant

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Table 4 : Distribution of the farmer according to their adoption level of Ajwain cultivation practices   (n=100)

Sr. No.	Category	Respondent	
		Frequency	Percentage
1.	Low	7	7.00
2.	Medium	85	85.00
3.	High	8	8.00
	Total	100	100

Table 5 : Co-efficient of correlation of independent variables with their adoption level

Sr. No.	Variables	'r' values	't' value
1.	Age	0.2272*	2.30
2.	Education	0.2988*	3.03
3.	Annual income	o.1911[NS]	1.82
4.	Land holding	0.1737 [NS]	1.75
5.	Area under Ajwain crop	0.3849*	4.12
6.	Irrigation facilities	0.3232*	3.38
7.	Social participation	0.2062*	2.08
8.	Economic motivation	0.3254**	3.40
9.	Sources of information	0.3999**	4.31
10.	Scientific orientation	0.2217*	2.25

* and ** indicates of significance of values at P=0.05 and P=0.01, respectively; NS = Non-significant

Table 6 : Distribution of respondents according to practicewise adoption of recommended practices of Ajwain cultivation

Sr. No.	Practices	Extent of adoption					
		Full adoption		Partial adoption		Non-adoption	
		Freq.	%	Freq.	%	Freq.	%
1.	Soil type: (well drain, heavy to medium avoid sandy soil)	85	85.00	15	15.00	0	00.0
2.	Varieties: Recommended (AA-01-19) or (Local, RA-1-80, AA-09-61, GA-01)	6	6.00	12	12.00	82	82.0
3.	Seed rate and type of sowing : By seed drilling method 2.5 to 3.5 kg/ha, by dibbling method 1.5 to 2 kg/ha.	37	37.00	45	45.00	18	18.0
4.	Seed treatment : Use of Azotobactor It should be treated with bavistinie or Captan or Thiram @ 2.0 – 2.5 g/kg	3	3.00	12	12.00	85	85.0
5.	Sowing time: from the first week of Oct. to last week of Nov.	88	88.0	12	12.0	00	0.00
6.	Spacing : For row to row 60 – 90cm. by seed drilling For ridged and furrow 45 × 45 by dibbling.	55	55.0	35	35.0	15	15.0
7.	Fertilizer application: (40:20:00 NPK nitrogen in split dose *i.e.* 30 DAS) as well as soil testing report of fertility status.	2	2.00	18	18.0	80	80.0
8.	Irrigation schedule / protected irrigation : (In rainfed condition mainly at the time of flowering time means 70 – 85 DAS. Protected irrigation is required. In irrigated production system about 5 irrigation are required depending on climate and soil type at the interval of 15 – 25 days.)	18	18.00	4.0	4.00	78	78.0
9.	Weed management / Intercultural operation: (A total of 2-3 manual weeding and hoeing are required and chemically controlled by a preemenrgence application of pendimethaline @ 1kg/ha after sowing).	7	7.00	47	47.00	46	46.0
10.	Plant protection : Pest control: (Aphids:- Spray Diamethoate 30 EC 10ml/10 lt. of water) Diseases control : (Powdery mildew:- Dusting with sulphur 20 – 25 kg/ha Or spraying wetablekarather/ sulphur (0.1%) twice at flowering stage at 15 days interval.	22	22.00	11	11.00	67	67.0
11.	Harvesting : (160 -180 DAS. At maturity stage flowering seed begin develop and become brown in umbles. Harvested with manually, threshed to separate the fruits by beating with sticks)	81	81.0	19	19.00	00	0.00

Table 7 : Distribution of the respondents according to constraints encountered by them in cultivation of Ajwain

Sr. No.	Constraints	Respondents	
		Frequency	Percentage
1.	Unavailability of recommended variety / seed.	83	83.0
2.	Lack of knowledge about the seed rate.	37	37.0
3.	Unavailability of recommended fertilizer.	21	21.0
4.	Lack of knowledge about the insect and pest infestation.	13	13.0
5.	Insufficient sources of irrigation.	79	79.0
6.	Lower market prices at the time of higher production.	100	100
7.	Threshing problem.	94	94.0
8.	Lack of proper and technical guidance by expert	67	67.0
9.	Uncertainty of monsoon	76	76.0

sources of information were positively and significantly correlated with adoption at 0.05 level of probability. It is also observed that annual income and land holding non-significant correlation with the adoption.

Practice wise knowledge about recommended ajwain cultivation practices :

It is evident from the distribution in Table 6 that, the majority of the farmers near about completely adopted some ajwain cultivation practices like soil type (85.00%), recommended sowing time (88.00%) and time of harvesting (81.0%), However, it is noted that majority of respondents were not adopted recommended variety (82.0%), seed treatment (85.0%), and fertilizer application (80.0%) as per recommended practices. Majority of respondent did not follow the irrigation schedule (78.0%), non-adoption of chemically weed control and plant protection (46.0%) and (67.0%) of respondent, respectively.

Constraints :

The responses were recorded against their difficulty regarding the cultivation of ajwain. The frequency and percentage of each constraint were worked out to measure the constraints encountered by the respondents and categorized in Table 7.

It is depicted from Table 7 that cent per cent farmer had the problem of low market price at the time of higher production, near about the 100 per cent of the farmers had faced the problem of threshing due to unavailability of suitable thresher machine (94.0%), followed by (83.0%) of respondent had constraint about the unavailability of recommended seed, fifty per cent and above of the farmers had lack of irrigation sources (79.0%) it belonging to Akot tahsil which is salt tract region, followed by uncertainty of monsoon and lack of proper and technical guidance by expert (76.0% and 67.0%), respectively.

Conclusion :

It can be concluded that the majority of the responded

know the recommended practices of ajwain cultivation like seed rate and type of sowing (91.00%), cent per cent farmer had the knowledge about the sowing time and it play an important role in increasing the yield (100.0%), spacing (88.0%), weed management/ intercultural operation that is manually weeding and hoeing (67.0%), harvesting and stage of harvesting knowledge had (99.0%).Majority of the responded adopted the recommended practices of ajwain cultivation like like soil type *i.e.* well drain and heavy to medium (85.00%), recommended sowing time for ajwain crop (88.00%), spacing with sowing type (55.0%) and time of harvesting (81.0%).

Findings of the relational analysis as regard to knowledge revealed that among the selected variables age, education, area under ajwain crop, annual income was positively and significantly correlated with knowledge at 0.01 level of probability. Whereas land holding, irrigation facilities, social participation, sources of information and scientific orientation were positively and significantly correlated with knowledge at 0.05 level of probability and annual income found non significant.

As regard to adoption age, education, area under ajwain crop, irrigation facilities, social participation, and scientific orientation were positively and significantly correlated with adoption at 0.01 level of probability. Whereas economic motivation and sources of information positively and significantly correlated with adoption at 0.05 level of probability. It also observed that annual income and land holding non significant correlation with the adoption.

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