P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 4; April 2025; Page No. 34-37

Received: 31-01-2025
Accepted: 04-03-2025

Indexed Journal
Peer Reviewed Journal

Exploring farmers' perceptions and adoption of orobanche management methods

[1]B Hema, [2]A Srinivas, [3]Y Subbaiah and [4]S Kasturi Krishna

[1]Scientist, ICAR-National Institute for Research on Commercial Agriculture, Rajahmundry, Andhra Pradesh, India

[2]Scientist, Department of Agriculture of Agricultural Extension, ICAR-IIMR, Hyderabad, Telangana, India

[3]Principal Scientist, Department of Agriculture of Agricultural Extension, ICAR-National Institute for Research on Commercial Agriculture, Rajahmundry, Andhra Pradesh, India

[4]Principal Scientist, Department of Agriculture of Agronomy, ICAR-National Institute for Research on Commercial Agriculture, Rajahmundry, Andhra Pradesh, India

DOI: https://www.doi.org/10.33545/26180723.2025.v8.i4a.1731

Corresponding Author: B Hema

Abstract

The present study is an attempt to analyze the farmers perception and adoption behaviour with respect to *orobanche* management. *Expost facto* research design is used, and random sampling technique is employed in selection of respondents. The study is based on field survey and interaction with FCV tobacco farmers in Andhra Pradesh and Karnataka. The primary data was collected from 30 randomly selected FCV tobacco farmers in each of the two tobacco growing regions *viz*., Southern Light Soils (SLS) & Southern Black Soils (SBS) in Prakasam district of Andhra Pradesh and Karnataka Light Soils (KLS) region in Mysuru district of Karnataka thus making total sample size of 60 respondents. Results showed that *orobanche* menace is more prominent in FCV tobacco cultivated in black soils and drought condition triggers the parasite in Andhra Pradesh and Karnataka respectively. Majority of the farmers follow physical removal of the parasite, deep summer ploughing, inundation to the fields and crop rotation as commonly followed practices for its management. Low adoption behaviour was observed among the respondents in both the study areas. Correlation analysis of independent variables with the adoption behaviour showed that operational land holding, annual income, cosmopolitan nature, mass media exposure, extension contact and participation in extension activities exhibited significant correlation.

Keywords: Adoption, farmers, FCV tobacco, management, *Orobanche* and perception

Introduction

Parasites, the unwanted guests in the cultivated crops get their nutrition by stealing it from host plants. Notably, Orobanche is recognized as the most notorious and harmful parasite, primarily affecting the roots of crops that hold economic value. Orobanche, commonly known as broomrape, poses a considerable challenge to various legume crops such as faba bean (*Vicia faba*), pea (*Pisum sativum*), lentil (*Lens culinaris*), and chickpea (*Cicer arietinum*), as well as to commercial crops. According to the findings of Das (2019) [3], the annual impact of orobanche infestation on crops can range from complete loss (100%) to no damage (0%), with total crop losses globally estimated to be between $1.3 billion and $2.6 billion. *Orobanche* species display high diversity regarding their host range. However, the infection severity varies among different crops across regions. In the field study conducted by Shekhawat *et al*., (2012) [16] reported that there is 28% reduction in the seed yield of Indian mustard which was due to parasite infestation and caused great damage across the world. According to Akhter *et al*., (2018) [1] a significant yield drop of around 15-49% has been recorded in the mustard was noticed. As already mentioned above, this parasite infestation is not an exception in commercial crops among which, particularly *Orobanche cernua* is problem in tobacco. Reports also showed that it is a major biotic production constraint to Indian tobacco. Punia (2014) [11] estimated that in Andhra Pradesh, 50% area under tobacco (40,000 ha) was infested with broomrape and caused 50% crop loss. In Karnataka, 90% area under tobacco was infested with this parasite which was accounted to 50- 60% yield deficit.

India has emerged as the second largest tobacco producer (761 M kg) after China (2135 M kg) globally (FAOSTAT 2020) [4]. The export of tobacco and tobacco products from India have increased from Rs 6058 crores in 2015-16 to Rs 6305 crores in 2020-21 (Tobacco Board, 2021) [20]. Tobacco specifically FCV (Flue Cured Virginia) is boon to farming community. Among different crops grown, farmers reap riches in cultivation of tobacco in specific regions of Andhra Pradesh and Karnataka as these are the major FCV tobacco growing regions of the country. There is more feasibility for cultivation of FCV tobacco in these regions which is due to the prevailing demand in the market. Unfortunately, broomrape remain an uncontrolled problem to the tobacco farmers in these two states leading to significant decline in crop yield and distressed crop quality in infested fields. Considering the vital importance of FCV tobacco crop in the

context of profitability to the farming community and high foreign exchange to the national economy, the present study has been carried out with a primary objective of analyzing farmers perception and adoption behaviour with respect to *orobanche* management in tobacco.

Methodology

The present study used *Expost facto* research design and random sampling technique is employed in selection of respondents. The study is based on field survey and interaction with FCV tobacco farmers in Andhra Pradesh and Karnataka. These states were purposively selected as these are the major FCV tobacco growing regions of the country. The primary data was collected from 30 randomly selected FCV (Flue Cured Virginia) tobacco farmers in each of the two tobacco growing regions *viz*., Southern Light Soils (SLS) & Southern Black Soils (SBS) in Prakasam district of Andhra Pradesh and Karnataka Light Soils (KLS) region in Mysuru district of Karnataka thus making total sample size of 60 respondents. To analyze the perceptions opined by the respondents in *orobanche* management, a suitable semi structured interview schedule was developed based on the discussion with experts, farmers and through data from relevant review of literature. The data collected were coded, tabulated and to investigate the perception and adoption behaviour, Friedman's non-parametric test and correlation analysis was employed for analysis.

Results and Discussion

Farmers Perception on *Orobanche* in FCV Tobacco

To measure the perception level of farmers, a set of statements were identified. Friedman's test was carried out and the results presented in Table 1 revealed that the mean ranks under each region were different.

Table 1: Perception of farmer's towards *orobanche* menace (N=60)

Statements	Mean ranks	
	Andhra Pradesh (SLS&SBS)	Karnataka (KLS)
Infestation is common in tobacco fields	3.75	4.12
Prominent in specific soil type	4.95	3.56
Persistent nature of parasite	3.60	4.52
Recommended practices are not effective	2.31	2.42
Drought condition is more favourable	2.41	4.67

Perusal of Table 1 showed that in SLS & SBS regions, farmers opined that *orobanche* menace is more prominent in FCV tobacco cultivated in black soils (mean rank 4.95) followed by infestation is common in tobacco fields (mean rank 3.75). Das *et al.*, (2019) [3] stated that soil type usually has no influence on germination, but *Orobanche* is believed to cause more damage in soils with low fertility. Punia (2014) [11] also observed that this parasite has the tendency to thrive well in soils having coarse texture, high pH, low nitrogen status, poor water holding capacity and where the crop cultivation is either rainfed or dependent on sprinkler irrigation. Regarding infestation, tobacco farmers believe that the extent of damage is unpredictable. Systematic studies conducted by Das *et al.*, (2019) [3] on various *orobanche* species reported the yield loss in faba bean (12-40%), sunflower (20-55%), tomato (30-55%), tobacco (25-50%), chilli (80%), mustard and potato (20-40%), muskmelon and watermelon (20-70%).

KLS farmers strongly felt that drought condition triggers the parasite for germination (mean rank 4.67) followed by persistent nature (mean rank 4.52). Studies conducted by Shah *et al.*, (2022) [15] on climate change effects on weed growth showed that that as per farmers' response, the parthenium was the most (82%) responsive invasive weed to climate change. Malarkodi *et al.*, (2017) [9] also reported that increase in atmospheric temperatures could also trigger some weeds like which weed and the crop weed competition could also be influenced by varying magnitude of response to the rising temperature and floral reproductive ability of weeds. Persistent nature of the parasite is another major concern for the farmers. This is supported with the study conducted by Puzzilli (1983) [12] revealed that the extremely small seeds produced by the *orobanche* in vast numbers has seed longevity in fields is up to 13 years. Ghosh *et al.*, (2021) [5] also made similar study on the aspects of perception analysis of the respondents.

Farmers practices in *Orobanche* management

Farmers in the study area follow different management practices to control the parasite which are economical and feasible. The most followed practices in the two regions were identified and analyzed by using Friedman's test and the results were depicted below (Table 2).

Table 2: Practices followed by FCV Tobacco Farmers in *Orobanche* Management (N=60)

Farmers practices	Mean ranks	
	SLS&SBS	KLS
Physical removal of *orobanche* before it flowers	6.36	5.67
Deep summer ploughing	6.26	5.82
Physical removal of *orobanche* after flowering	5.09	4.32
Cultivation of trap crop/green manuring crop before tobacco	4.35	4.16
Inundation to the main field	3.87	6.82
Neem cake application	3.88	2.34
Crop rotation	3.60	6.17
Timely intercultural operations	2.34	4.84
Sanitary measures	2.41	2.78
Alteration in planting dates	1.54	2.59

Results from Table 2 revealed that SLS&SBS region tobacco farmers follow physical removal of the parasite before it flowers (mean rank 6.36) and deep summer ploughing (mean rank 6.26). Farmers believe that clean cultivation followed by physical removal before flowering was commonly practiced for *orobanche* control. At the same time, weeding of the parasites is not very promising in heavily infested areas, time-consuming, tedious and can cause injuries to the main plant root system. Various research reports suggested different strategies for *orobanche* species control. Among which deep ploughing was proposed for *Orobanche ramosa* in tomato and *Orobanche cernua* in tobacco. The same results were also confirmed by Qasem (2021) [13] mentioned that a depth of 40-50 cm deep tillage reduced *Orobanche* by 80-90% in three year-period in broad beans. It is also observed that some farmers in the study area removing *orobanche* after flowering stage (mean rank 5.09). This is due to labour unavailability for the operations and lack of awareness of the farmer that a single parasite plant can release lakhs of seeds which are known to

remain viable for many decades in the soil. A review conducted by Habimana *et al.*, (2014) [6] reported the similar findings.

Majority of the respondents from KLS region follow inundation to the tobacco field (mean rank 6.82) followed by crop rotation (mean rank 6.17) to control *orobanche*. But, under rainfed cultivation, water scarcity could not permit this method. Punia (2014) [11] stated that less damage of the parasitic weed has been observed in mustard grown under flooded irrigation as compared to sprinkler system or on conserved moisture as the seeds of the parasite do not survive on extended periods of inundation. This is similar to the findings of Qasem (2021) [13] observed that water lodging inhibited *orobanche* emergence when applied for more than 6 weeks duration. Besides, KLS farmers follow crop rotation with ragi in tobacco growing fields to control *orobanche*. A field study confirmed by Habimana *et al*., (2014) [6] that crop sequence of onion-onion-onion/tomato and/or onion-alfalfa-alfalfa-tomato decreased *Orobanche* infestation by 90-95 per cent and the yield of tomato was increased by 60 per cent.

Adoption Behaviour of FCV Tobacco Farmers in *Orobanche* Management

Information on adoption level of farmers regarding parasite management was collected with the help of interview schedule. These responses are presented below (Table 3).

Table 3: Adoption of *Orobanche* Management Practices (N=60)

Adoption level	SLS & SBS		KLS	
	F	%	F	%
Low	14	47	13	43
Medium	11	37	11	37
High	5	16	6	20

The data regarding the level of adoption have been presented in Table 3. It is evident that low level of adoption was observed among farmers in adoption of parasite management practices. Few farmers still not aware about the importance of *orobanche* management as they feel in case of insects, pests and diseases. Study conducted by Singh *et al.*, (2018) [18] found that majority of the respondents had medium extent of adoption of integrated weed management practices. It is observed from the study area that majority of the farmers do not know the biology of these parasites. Some even think that they reproduce by rhizomes and stolons, others have never seen tiny seeds produced by these parasites, ignore the existence of a subterranean growth phase and therefore resulted in low level of adoption. Besides, small holder farmers are the most affected by the *orobanche* problem because they have limited ways and means of controlling it. According to Hema *et al.*, (2021) [7] average own land size of tobacco farmers is 3-5 acres in the study area of KLS is due to small land holdings.

Correlation between Socio-personal Characteristics of Respondents and Adoption

The association of nine independent variables were analyzed with the dependent variable *viz.*, adoption behaviour and the results were displayed in Table 4.

Table 4: Relationship between adoption level of respondents and independent variables (N=60)

Independent variables	Pearson Correlation Coefficient (r)
Age	0.016^{NS}
Family type	-0.075 ^{NS}
Education	0.084 ^{NS}
Operational land holding	0.123**
Annual income	0.045**
Cosmopolitan nature	0.414*
Mass media exposure	0.332*
Extension contact	0.230*
Participation in extension activities	0.248*

*Significant at 5%; ** Significant at 1%

Table 4 enlists the adoption behaviour of farmers to nine attributes. The association between extent of adoption and selected independent variables was worked out in terms of Pearson Correlation Coefficient (r values). The results indicated that operational land holding, and annual income had significant correlation at 1 per cent with the adoption of management practices. Annual income is one of the factors which affect the adoption level of farmers. Farmers with more annual income are expected to be early and fast adopters due to their risk bearing ability. In the investigation carried out by Hussain *et al.*, (2009) [8] that majority of farmers having encouraging levels of farm size (60%), surplus income (80%) attained high level of technology adoption behaviour. In contrast, Singhal *et al.*, (2017) [19] estimated that size of land holding had no effect in influencing the adoption behaviour of the farmers.

It is also well apparent from the findings that cosmopolitan nature, mass media exposure, extension contact and participation in extension activities exhibited significant correlation at 5 per cent with the adoption of management practices. Cosmopolitan nature gives an opportunity to the farmers to widen their scope to gain better knowledge, frequent contact for interaction, proper platform to discuss their problems This result was in accordance with the findings of Singh *et al.*, (2016) [17] and Prajapati *et al.*, (2015) [10]. It is also evident that age, family size and education of the respondents had non-significant association with the adoption. A study undertaken by Rakesh *et al.*, (2022) [14] on adoption behaviour stated that the age of the respondents was found negatively, and size of land holding was positively non-significant. Anusha *et al.*, (2021) [2] also made similar attempt on the correlation analysis of the respondents.

Conclusion

The present study revealed that *orobanche* is threatening the livelihood of FCV tobacco farmers in Andhra Pradesh and Karnataka. Perception analysis from the farmers showed that soil type and climate condition are the favourable factors for the *orobanche* occurrence in FCV tobacco. Although farmers are aware about different management measures; physical removal, dep summer ploughing, inundation to tobacco fields and crop rotation are the most often practices followed by the farmers. Majority of the farmers still not aware about the complete damage caused by the *orobanche* as they feel in case of insects, pests and

diseases therefore resulted in low level of adoption behavior in its management. The study concluded that operational land holding, annual income cosmopolitan nature, mass media exposure, extension contact and participation in extension activities were found positively and significantly associated with extent of adoption of *orobanche* management practices by the FCV tobacco farmers.

References

1. Akhter G, Khan TA. Evaluation of different genotypes of mustard against *Orobanche aegyptiaca*. J Oilseed Brassica. 2018;9(2):182-184.
2. Anusha P, Sushma K. Correlation analysis of personal variables with livelihood capabilities and livelihood securities. Indian J Ext Educ. 2021;57(3):72-7.
3. Das TK, Ghosh S, Gupta K, Sen S, Behera B, Raj R. The weed *Orobanche*: species distribution, diversity, biology and management. J Res Weed Sci. 2019;3(2):162-80.
4. FAOSTAT. 2020. Available from: https://www.fao.org/faostat/en/#data/QCL.
5. Ghosh A, Basu D, Dana SS, Chakraborty S. Perception on handling practices and training needs of agricultural input dealers: An exploratory study in West Medinipur, West Bengal. Indian J Ext Educ. 2021;57(3):1-7.
6. Habimana S, Nduwumuremyi A, Chinama JD. Management of *Orobanche* in field crops - A review. J Soil Sci Plant Nutr. 2014;14(1):43-62.
7. Hema B, Damodar Reddy D, Viswanatha Reddy K, Srinivas A, Kasturi Krishna S. Impact assessment of flue-cured Virginia tobacco in Mysore and Hassan districts of Karnataka. Indian J Ext Educ. 2021;57(2):76-81.
8. Hussain A, Chauhan J, Singh AK, Yousuf S. A study on adoption behaviour of farmers in Kashmir Valley. Indian Res J Ext Educ. 2009;9(2):46-9.
9. Malarkodi N, Manikandan N, Ramaraj AP. Impact of climate change on weeds and weed management - A review. J Innov Agric. 2017;4(4):1-7.
10. Prajapati JV, Patel JB, Bhatt PM. Extent of adoption of low-cost technologies of animal husbandry by tribal dairy farmwomen. Indian Res J Ext Educ. 2015;15(4):47-50.
11. Punia SS. Biology and control measures of *Orobanche*. Indian J Weed Sci. 2014;46(1):36-51.
12. Puzzilli M. Tobacco broomrapes and their control and some useful references to other parasite and host species. Rev Agric Subtropicale e Tropicale. 1983;78:209-248.
13. Qasem JR. Broomrapes (*Orobanche* spp.) the challenge and management: A review. J Agric Sci. 2021;17(3):115-148.
14. Rakesh N, Sharma RN, Yadav JP, Ghoslya AK, Kansotia RK, Haritwal K. Relationship between personal characteristics and adoption of drip system of irrigation of vegetable growers in the adopted villages of SKNAU, Jobner. Indian J Ext Educ. 2022;58(1):213-6.
15. Shah AI, Khan H, Gul B, Uslu OS. Farmers' perception of climate change and *Parthenium* weed distribution in district Swabi, Khyber Pakhtunkhwa. Pak J Weed Sci Res. 2022;28(3):167-78.
16. Shekhawat K, Rathore SS, Premi OP, Kandpal BK, Chauhan JS. Advances in agronomic management of Indian mustard (*Brassica juncea* (L.), Czernj. Cosson): An overview. Int J Agron. 2012;1-14.
17. Singh DV, Mishra A, Singh SRK. The extent of adoption of the market intelligence among the summer cabbage growers. Int J Humanities Social Sci Invention. 2016;5(7):67-70.
18. Singh PK, Gharde Y, Choudhary VK. Adoption of integrated weed management practices correlates with farmers profile characteristics. Indian J Weed Sci. 2018;50(1):69-71.
19. Singhal S, Lalita V. Factors influencing adoption of improved agricultural technologies. Indian J Family Community Stud. 2017;1(1):16-28.
20. Tobacco Board. 2021. Available from: https://tobaccoboard.com/tbdata/publicationsfiles/TOB_AR_2020-2021__E_.pdf.