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Utilization of HORTSAP (Horticultural pest surveillance and advisory project) by the beneficiaries of Ahilyanagar and Nashik district

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Abstract

The present study was conducted in Nashik and Ahilyanagar district of Maharashtra about the utilization of HORTSAP. The study was conducted purposively in selected Malegaon and Satana tahsils of Nashik district for pomegranate and Sangamner and Akole tahsil of Ahilyanagar district for tomato since the Nashik and Ahilyanagar have highest number of HORTSAP beneficiaries in Maharashtra state. The data was collected by interviewing 120 host beneficiaries with well-designed and pre-tested schedule. Data were coded, tabulated, analyzed and interpreted using suitable statistical parameters. In utilization study, it was found that 34.16 percent beneficiary utilize HORTSAP for management of pest and diseases, 39.16 percent of beneficiary utilize it for updating knowledge related to modern package of practices in diseases and pest management. 37.50 percent of beneficiary utilize it for taking preventive measure prior to diseases and pest infestation, while in case of overall utilization majority of respondents were moderately utilized HORTSAP. Out of 120 beneficiary 44.17 percentage were moderately utilized it followed by 32.50 percent and 23.33 percent were low and high utilization of HORTSAP respectively.

Keywords: Utilization, HORTSAP beneficiary, pest surveillance, advisory project

Introduction

Department of Agriculture and Marketing, Government of Maharashtra recognized the need to invest in and pioneered implementation of e-pest surveillance program and to promote farmers' participatory pest management practices. HORTSAP is an e-pest surveillance and pest advisory project for nine horticultural crops like banana, mango and pomegranate etc. and was launched during the year 2011-12 by the Commissionerate of Agriculture, Maharashtra State. The initiative also aligns with the demographic profile of the farming community, where earlier studies have shown that a large proportion of agricultural practitioners fall within the *middle-age category*, which is often considered the most active and responsive group for adopting new technologies (Jagtap, 2013; Kale *et al.*, 2014; Gudadhe, 2015; Naina Virang, 2016; Deshmukh *et al.*, 2018; Sikarwar, 2019; Bari, 2020) [50, 53, 44, 78, 28, 96, 15]. Similar observations about farmers' age distribution across different projects emphasize the feasibility and receptiveness of such ICT-based interventions (Navya & Venkataranganaika, 2021; Priyanka *et al.*, 2024) [80, 85]. There are many other programmes implemented for fulfilling these objectives, but the ICT-based e-pest surveillance programme was started in 2011-12 to keep a constant watch on pest and disease activities and issuance of timely eco-friendly integrated pest management advisories. The purpose was to prevent losses due to pests, minimize contamination of produce by pesticide residues, and address environmental and quarantine concerns. Since then, the project continued to meet its targets and objectives successfully in its fourth year (2024-25), reflected through rising productivity trends in targeted fruit crops like mango, banana and pomegranate (Kamble *et al.*, 2017) [54]. Effective uptake of such programs is further influenced by farmers' educational status, where a majority of farmers across regions possess education ranging from middle school to high school level indicating adequate learning capacity for adopting structured advisory systems (Tayade, 2016; Bhaltik, 2017; Jadhav, 2018; Sikarwar, 2019; Mhaske, 2020; Navya &

Venkataranganaika, 2021; Vyas, 2023; Khemekar *et al.*, 2024; Priyanka *et al.*, 2024) [100, 17, 48, 96, 68, 80, 104, 60, 85]. The objectives of the project include pest surveillance, training of field staff regarding crop pests and diseases, data entry, and issuance of pest management advisories based on economic threshold levels, using ecofriendly and environmentally compatible strategies.

In the era of globalization, major concerns include the quality of harvested fruits, profitability to farmers, pesticide residue levels, and pest infestation in produce. Policy makers weighed the need for high-quality produce and international competitiveness against the negative externalities of pesticide use. These concerns are also connected with the socio-economic background of farmers landholding patterns and income categories reported across various studies show a predominance of small, marginal and semi-medium farmers who are highly vulnerable to crop losses and thus benefit significantly from timely advisories (Pattanashetti & Nithyasree, 2012; Hirve, 2013; Rao, 2013; Raksha, 2014; Sivaraj *et al.*, 2017; Ansari *et al.*, 2018; Ahire *et al.*, 2018; Jakkawad *et al.*, 2019; Vyas, 2023; Khemekar *et al.*, 2024; Priyanka *et al.*, 2024) [83, 109, 88, 87, 97, 11, 6, 52, 104, 60, 85]. Income-based studies further highlight that a majority of respondents fall within medium or lower income categories, underscoring the necessity of cost-effective pest management practices (Ghadi, 2008; Gote, 2009; Salunkhe, 2011; Shiraskar, 2011; Ansari *et al.*, 2018; Raghuvanshi *et al.*, 2018; Kaur, 2021; Vyas, 2023; Priyanka *et al.*, 2024) [42, 43, 91, 95, 11, 86, 56, 104, 85]. For pest surveillance, pest scouts identified major pests and diseases in the field. Each scout collected data from eight fixed villages per week, taking observations on Monday & Tuesday and Thursday & Friday for 16 fixed and 16 random plots. Reports were submitted to the Agricultural Supervisor on Wednesday and Saturday. Agriculture supervisors monitored the pest scouts through random surprise checks and conducted roving surveys at 5-10 villages per day. Data entry operators compiled both fixed and roving plot reports into the online system (www.ncipm.org.in) (Mote, 2012) [72]. Adoption of structured survey methods echoes earlier findings on the importance of extension contact and information channels among farmers, where studies showed that farmers actively engage with extension personnel, input dealers, scientists, and other farmers for knowledge enhancement (Viswanatha *et al.*, 2014; Martey & Aborakwa-Larbi, 2016; Tikariha, 2016; Khatri, 2017; Dudhe, 2020) [108, 65, 102, 59, 35]. The entire data set was compiled online, and village-, taluka- and district-level reports were generated automatically by the software. Research Associates at SAUs interpreted the data under the guidance of Heads of Entomology and Plant Pathology. Based on pest status and weather reports from CRIDA Hyderabad, taluka-wise advisories were issued online by agricultural universities. Advisory capsules were prepared during stakeholder technical meetings (Adsul, 2016) [3].

Based on collected data, advisory services were issued to farmers for creating awareness. State agricultural universities released advisories every Thursday and Monday. Two types of advisories were disseminated detailed advisories for field-level dissemination through agricultural staff, radio, television, exhibitions, village fairs, notice boards, etc., and short advisories sent via SMS to elite farmers. Such dissemination systems are particularly

useful as earlier research has confirmed that farmers depend heavily on extension networks, SMS alerts, input dealers and allied institutions for timely crop management decisions (Viswanatha *et al.*, 2014; Tikariha, 2016; Martey & Aborakwa-Larbi, 2016; Dudhe, 2020) [108, 102, 65, 35]. Agriculture supervisors and pest scouts further created awareness during field visits (Ahire & Kharde, 2013) [5]. The project's success was enabled by coordinated efforts of the State Agriculture Department, SAU scientists, KVKs and ICAR institutes, along with strong linkages between stakeholders and end users. This collaborative framework also benefited from the diversity in cropping patterns observed across Maharashtra, where research shows a consistent shift from cereals to fruits, vegetables, pulses and high-value crops making pest surveillance in horticulture even more critical (Ahmed *et al.*, 2014; Dhole, 2015; Jagdale, 2015; Meena, 2015) [107, 34, 49, 67]. In view of the successful implementation of e-pest surveillance, other fruit crops such as sweet orange, Nagpur mandarin, sapota, santra, banana, mango and tomato were also included in the project from 2024-25. This required software up-gradation and revision of the e-pest surveillance manual. It is expected that this compilation will cater to field functionaries and progressive farmers by enabling correct pest identification and timely ETL-based IPM implementation.

Maharashtra has over 15 lakh ha area under fruit crops and emphasizes judicious and timely pesticide use to improve export potential and reduce health hazards. The state has strengthened partnerships with NCIPM-ICAR, NRC Pomegranate, NRC Banana, MPKV Rahuri and DBSKKV Dapoli for surveillance planning and pest management expertise. The objectives of e-pest surveillance scientific pest control through field observations, timely data upload, expert analysis and advisory generation have been achieved through a three-pronged approach involving weekly pest incidence recording, central data assimilation and ETL-based advisory issuance. The success of this program is attributed to accurate pest identification, timely data entry, expert accessibility, software reliability and efficient advisory delivery systems (HORTSAP User Manual 2014-15).

Methodology

The current research is about "Perception and Utilization of HORTSAP among Beneficiary ". The researcher has no control over the independent variables that have already occurred. As a result, the current study employed an ex-post facto social research design. The current study was carried out in Nashik and Ahilyanagar district, which has the maximum HORTSAP beneficiary in the state of Maharashtra. As a result, the district Nashik and Ahilyanagar was chosen for the purpose. There are two Tehsils from each Nashik and Ahilyanagar District, were chosen for study. Malegaon and Satana tehsils of Nashik district and Sangamner and Akole tahsil from Ahilyanagar were selected purposively for this study because of having maximum number of beneficiaries covered under HORTSAP advisory for present study. Ten respondents were selected from each village by random sampling method. In all 120 HORTSAP beneficiary are selected randomly from 12 villages of tehsils Malegaon and Satana from Nashik district and Sangamner and Akole tehsils from Ahilyanagar district.

Results and Discussions

Utilization

It is defined as the level with which the beneficiaries utilize information from mobile based agro-advisory services such

as sowing, fertilizer application, insect pest, harvesting, weather information, government programmes and many more.

Table 1: Distribution of beneficiary according to their utilization towards HORTSAP

Sr. No	Statement	VF	F	LF	VL	NA
1.	For management of pest and diseases of Tomato.	10 (08.33)	41 (34.16)	37 (30.81)	21 (19.00)	10 (07.7)
2.	For management of pest and diseases of Pomegranate.	30 (25.00)	42 (35.00)	29 (24.16)	13 (10.84)	06 (05.00)
3.	For updating knowledge related to modern package of practices in disease and pest management.	26 (21.66)	47 (39.16)	28 (23.36)	05 (04.16)	14 (11.66)
4.	SMS are used to deliver the advisory to Beneficiary for control of the diseases.	24 (20.00)	40 (33.33)	32 (26.66)	11 (09.16)	13 (10.85)
5.	For taking preventive measure prior to The disease and pest infestation.	26 (22.66)	45 (37.50)	31 (25.85)	08 (06.49)	09 (07.50)
6.	University recommendations for Management of disease and pest outbreak.	11 (09.16)	38 (31.66)	40 (33.35)	22 (18.33)	09 (07.50)
7.	Supply of pesticides in emergency Situation to area affected by pest outbreak is covered under HORTSAP.	11 (09.16)	27 (25.50)	48 (40.00)	20 (13.34)	14 (12.00)
8.	To prevent losses of the beneficiary due To the sudden outbreak of pest disease.	23 (19.16)	40 (33.35)	26 (21.66)	16 (13.33)	15 (12.50)
9.	To create awareness among beneficiary In disease and pest management.	19 (15.83)	46 (38.33)	32 (26.68)	12 (10.00)	11 (09.16)

(Very Frequently = VF, Frequently = F, Less Frequently = LF, Very Less = VL, Not at less = NA)

The result showed that 34.16 percent of beneficiary utilize HORTSAP for management of pest and diseases of tomato and 35 percent of beneficiary utilize HORTSAP for management of pest and diseases pomegranate. About 40.00 percent beneficiary utilize HORTSAP for updating knowledge related to modern package of practices in disease and pest management. More than one third of beneficiary were benefited from HORTSAP as SMS are used to deliver the advisory to beneficiary for control of the diseases.

Most of the beneficiary utilize HORTSAP for taking preventive measure prior to the disease and pest infestation, 33.33 percent of HORTSAP beneficiary use University recommendation for management of disease and pest outbreak and 40 percent beneficiary noted that supply of pesticide in emergency situation to area affected by pest outbreak which is covered under HORTSAP. About one third of beneficiary utilize HORTSAP so as to prevent losses of the beneficiary due to the sudden outbreak of pest disease. And 38.33 percent HORTSAP beneficiary used to create awareness among beneficiary in disease and pest management.

Table 2: Distribution of beneficiary according to their utilization toward HORTSAP project

Sr. No.	Category	Score
1.	Low	Up to 18
2.	Medium	19 to 25
3.	High	26 and above

Range = 7.33 Max = 32 Min = 10

Table 2 clearly indicates that the overall utilization of HORTSAP-advisory services was moderate among 72.50 percent of the respondents, while 15.0 percent exhibited high utilization and only 12.50 percent reported low utilization. This shows that a majority of farmers are making use of the advisory services, though not at an optimum level, suggesting a scope for improvement in adoption and effective usage. The overall utilization of HORTSAP-

advisory services is not uniform and is influenced by several socio-economic and personal factors. Farmers' age plays a role, as younger farmers tend to be more comfortable with mobile technology and quicker in adopting ICT-based services compared to older farmers. Educational level is another crucial determinant; farmers with higher education are generally more capable of understanding and interpreting the technical content of the advisories. Similarly, size of landholding and annual income affect utilization by the beneficiaries with larger holdings and Higher incomes often have greater exposure to modern technologies and are more likely to adopt advisory services to safeguard their investments.

The findings of the study reveal that HORTSAP has become an important ICT-based advisory tool for horticultural farmers in Nashik and Ahilya Nagar districts. The utilization pattern indicates that a substantial proportion of respondents frequently used HORTSAP for managing pest and diseases of major horticultural crops such as tomato (34.16%) and pomegranate (35.00%). These results align with the demographic and cropping trends reported in earlier studies, where horticultural farmers were found to actively seek scientific advisories for high-value crops due to their economic importance and vulnerability to pest outbreaks (Kamble *et al.*, 2017; Ahmed *et al.*, 2014; Meena, 2015) [54, 107, 67]. The strong utilization of HORTSAP for updating knowledge on modern pest and disease management practices (40%) corroborates earlier findings that farmers with moderate to high educational backgrounds are more receptive to structured advisory systems and scientific recommendations (Tayade, 2016; Bhaltalik, 2017; Jadhav, 2018; Vyas, 2023; Priyanka *et al.*, 2024; Khemekar *et al.*, 2024) [100, 17, 48, 104, 85, 60]. The active use of SMS-based advisories observed in this study also supports earlier reports which indicate that rural farmers increasingly depend on mobile-phone-based messaging and digital extension tools for timely information (Viswanatha *et al.*, 2014; Tikariha, 2016; Martey & Aborakwa-Larbi, 2016;

Dudhe, 2020) [108, 102, 65, 35]. Preventive application of advisories where 37.50 percent of farmers frequently took precautionary measures before pest infestation further confirms the shift from reactive to proactive pest management. Similar behavioural patterns have been documented in studies highlighting that ICT-based advisories significantly enhance farmers preparedness and decision-making (Navya & Venkataranganaika, 2021; Priyanka *et al.*, 2024) [80, 85]. The finding that 33.33 percent of the farmers frequently adopted university recommendations supports the earlier evidence that farmers place high trust in SAU-generated advisories (Adsul, 2016; Mote, 2012) [3, 72].

The emergency pesticide supply reported by 40 percent of respondents indicates that HORTSAP functions not only as an information tool but also as a crisis-support mechanism. Such institutional responsiveness has been noted as a crucial factor in strengthening IPM adoption and reducing crop losses (Ahire & Kharde, 2013) [5]. Moreover, one-third of the farmers actively used HORTSAP advisories to prevent economic losses due to sudden outbreaks, reflecting the importance of real-time surveillance systems, as previously emphasized in pest-management studies (Sivraj *et al.*, 2017; Ansari *et al.*, 2018) [97, 11]. Awareness creation was another important outcome, with 38.33 percent of beneficiaries frequently using HORTSAP for knowledge dissemination. This aligns with earlier research showing that extension networks, mass media exposure, and participatory communication significantly enhance knowledge flow among farming communities (Viswanatha *et al.*, 2014; Khatri, 2017; Dudhe, 2020) [108, 59, 35]. The overall utilization pattern (72.50% moderate, 15% high, 12.50% low) is consistent with earlier studies reporting that ICT-based advisory services generally achieve moderate adoption in initial years and require continued sensitization for full-scale utilization (Gudadhe, 2015; Naina Virang, 2016; Deshmukh *et al.*, 2018; Sikarwar, 2019) [44, 78, 28, 96]. Socio-economic factors such as age, education, landholding and income significantly influenced utilization. Younger farmers were more comfortable using mobile-based advisories, consistent with earlier reports on digital adoption behaviour (Jagtap, 2013; Kale *et al.*, 2014) [50, 53]. Farmers with larger landholdings and higher incomes exhibited greater usage due to higher risk exposure and investment capacity, as reported by Raghuvanshi *et al.* (2018), Kaur (2021) and Vyas (2023) [86, 56, 104].

Innovativeness, extension contact, social participation and mass media exposure also played critical roles in shaping utilization behaviour. These findings are supported by several earlier studies showing that progressive farmers and those with frequent interaction with extension agencies adopt modern technologies more readily (Viswanatha *et al.*, 2014; Martey & Aborakwa-Larbi, 2016; Khatri, 2017; Tikariha, 2016) [108, 65, 59, 102].

Conclusion

The study revealed that the beneficiaries of Nashik and Ahilya Nagar districts perceived HORTSAP as a valuable tool for pest management in horticultural crops. Most respondents reported that the advisories provided through HORTSAP were timely, relevant, and helpful in reducing crop losses, improving decision-making, and promoting Integrated Pest Management (IPM) practices. The utilization pattern showed that a majority of beneficiaries regularly

accessed and applied the recommendations received via SMS, mobile apps, or extension personnel, though a few faced constraints such as limited internet connectivity, technical language of messages, and lack of awareness of certain features. Overall, the project has been successful in enhancing pest surveillance and advisory services in both districts, leading to improved crop health, reduced pesticide expenditure, and increased confidence among farmers. However, further strengthening is needed in terms of simplifying advisory content, ensuring wider awareness, providing follow-up training, and establishing a feedback mechanism to make the system more participatory and farmer-friendly. Thus, it can be concluded that HORTSAP plays a significant role in bridging the gap between scientific pest management knowledge and practical field application, and with appropriate refinements, it has the potential to serve as a model for sustainable horticulture across the state of Maharashtra.

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