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Awareness of drone technology application in agriculture amongst the progressive farmers

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Abstract

Drones, a type of unmanned aerial vehicle (UAV), is a versatile tool used for personal, military, and commercial applications. With increasing population and food demand, traditional farming methods alone are insufficient, creating a need for advanced technologies like drones to enhance agricultural productivity. Agricultural drone technology, first developed in the early 2000s by the Swedish University of Agricultural Science, enables precise field monitoring, crop mapping, and spraying, helping farmers make data-driven decisions. A study at Mahatma Phule Krishi Vidyapeeth, Rahuri (MPKV), aimed to assess the awareness of drone technology among progressive farmers across Pune, Kolhapur, Sangli, and Satara districts. The study involved 151 progressive farmers from various Farmers' Scientists' Forums of the agricultural colleges and agricultural research stations from MPKV, Rahuri. More than two-third (68.21 per cent) of progressive farmers had low level of awareness of drone technology application and the remaining 31.79 per cent of the progressive farmers had very low level of awareness of drone technology application in agriculture.

Keywords: Awareness, application of drone technology in agriculture, progressive farmers

Introduction

Drones, commonly associated with unmanned aerial vehicles (UAVs), are increasingly prevalent in various sectors, including agriculture. Quadcopters, in particular, have gained popularity for their ease of use and operational flexibility. As agricultural demands rise with population growth, traditional farming methods are proving inadequate, creating a need for innovative technologies to boost productivity. UAVs, equipped with cameras, sensors, and sprayers, offer significant potential in crop monitoring, chemical application, and yield management, potentially transforming farming into a data-driven, high-precision practice.

In recent years, the Indian government has promoted UAV adoption in agriculture, recognizing drones' capacity to enhance productivity, reduce labour burdens, and mitigate health risks associated with manual pesticide spraying. By 2023, drone usage in agriculture in India had increased markedly, aided by government initiatives such as subsidies and licensing options for drone operators. Despite these advancements, challenges remain in terms of farmers' awareness, knowledge, and willingness to adopt drone

technology.

Methodology

In the Agriculture Innovation System (AIS), advanced technologies like drones are often introduced through progressive farmers, who are typically more exposed to new tools than the general farming population. This study focused on evaluating the awareness of progressive farmers regarding drone applications in agriculture, as they are more likely to be early adopters. The study was conducted in the Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, which has established the Farmers' Scientists' Forums (FSFs) to facilitate knowledge sharing between university scientists and progressive farmers. The FSFs operate at the Agricultural Technology Information Centre (ATIC), along with Regional Extension Centres (RECs) and District Extension Centres (DECs). MPKV also runs a Directorate General of Civil Aviation (DGCA) authorized Remote Pilot Training Organization (RPTO) to certify drone pilots, launched in 2021 under the CAAST-CSAWM project. The study targeted farmers in the Pune, Kolhapur, Sangli, and Satara districts, as identified by MPKV's RPTO for high drone adoption rates in agriculture. Specifically, 151

progressive farmers were selected from the FSF groups across various research stations, RECs and DEC's within these districts, providing a focused sample for assessing awareness about drone technology in agricultural applications.

Results and Discussion

- The awareness of progressive farmers about the application of drone technology in agriculture

1. Detailed awareness of progressive farmers about the application of drone technology in agriculture

Table 1: Distribution of progressive farmers according to their detailed awareness of drone technology application in agriculture

Sl. No.	Particulars	No. of Respondents (N=151)			
		Aware		Not Aware	
		Frequency	Percentage	Frequency	Percentage
1	To monitor agricultural land	0	00.00	151	100
2	To monitor crops	0	00.00	151	100
3	Inspecting the crop to identify crop health problems	0	00.00	151	100
4	To apply agro chemicals (fertilizers, bio-fertilizers, fungicides, herbicides, insecticides, fungicides, etc.) in a proper manner (spraying / dusting)	103	68.23	48	31.77
5	Adequate application of agrochemicals (fertilizers, bio-fertilizers, fungicides, herbicides, pesticides, fungicides, etc.)	103	68.23	48	31.77
6	To monitor the water status of the crop body	0	00.00	151	100
7	To monitor nutrient utilization by crops	0	00.00	151	100
8	To monitor crop pests attack	0	00.00	151	100
9	To monitor crop diseases attack	0	00.00	151	100
10	To provide foliar spray to crops during irrigation deficit	0	00.00	151	100
11	UAV or Quadcopter technology behind the use of drones	40	26.50	111	73.50
12	Training required for use of drone technology in agriculture	103	68.23	48	31.77
13	Awareness of progressive farmers about drone training centers				
	14.1 KVK	54	35.76	-	-
	14.2 Sugar Factory	26	17.21	-	-
	14.3 University	23	15.23	-	-
	Total	103	68.23	48	31.77
14	Awareness of progressive farmers about the need of a license for use of drones in agriculture	103	68.23	48	31.77
15	Awareness of progressive farmers about the licensing authority (i.e. DGCA) for application of drones in agriculture	41	25.15	110	72.85
16	Awareness of progressive farmers about who are eligible for seeking the license for application of drone technology in agriculture				
	16.1 Farmers	-	-	-	-
	16.2 Farmers group	-	-	-	-
	16.3 Farmers company	-	-	-	-
	16.4 Single person	-	-	-	-
	16.5 Private company	-	-	-	-
	16.6 Government organization	-	-	-	-
	16.7 All above	103	68.23	48	31.77
17	Awareness of progressive farmers about types of drones that can be used for agricultural applications				
	17.1 Fixed wing drones	0	00.00	151	100
	17.2 Multirotor drones	0	00.00	151	100
	17.3 Vertical takeoff and landing drones	0	00.00	151	100
18	What are the different capacities of drones used for the agricultural sector				
	18.1 Nano (up to 250 g)	0	00.00	151	100
	18.2 Micro (250g to 2 kg)	0	00.00	151	100
	18.3 Small (2kg to 25 kg)	103	68.23	48	31.77
	18.4 Medium (25kg to 150 kg)	0	00.00	151	100
	18.5 Large (more than 150 kg)	0	00.00	151	100
19	Hiring drones for agricultural use	103	68.23	48	31.77
20	Awareness about companies that provide services to use drone technology in agriculture	103	68.23	48	31.77
21	Awareness of progressive farmers about drone service providers				
	21.1 UAV	19	12.28	-	-
	21.2 Drone culture	9	05.96	-	-
	21.3 Drone master	16	10.60	-	-
	21.4 Sanket drone company	12	07.95	-	-
	21.5 Kirtikumar drone company	8	05.30	-	-
	Total	64	42.39	87	57.61
22	Awareness of progressive farmers about expenditure of application of drone technology in agriculture per acre				
	Low (Up to ₹ 2200)	38	25.16	-	-
	Medium (₹ 2201 to ₹ 2600)	32	21.19	-	-
	High (₹ 2601 and above)	28	18.55	-	-
	Total	98	64.90	53	35.09

Table 1 shows that 100.00 per cent of the respondents had no awareness that drones are used for agricultural land monitoring, crop monitoring and inspecting the crop to identify crop health problems. There were 68.23 per cent of farmers that were aware about spraying agro chemicals in proper manner with adequate amount and only 31.77 per cent of the farmers were not aware about it. Cent per cent of the farmers were not aware about drones were being used for monitoring water status of the crops, monitoring nutrients utilized by the crops, monitoring crop pests and diseases attack. Not even a single farmer was aware about drones being used for providing foliar spray to crops during irrigation deficit period.

Only 26.50 per cent of the progressive farmers were aware about the UAV or Quadcopter technology behind the use of drones while the remaining 73.50 per cent were not aware about it. More than two-third of the respondents (68.23 per cent) were aware about training being must for operating drones for agricultural applications. There were 31.77 per cent of the farmers that were not aware about training requirements for using drones in agriculture. There were 68.23 per cent progressive farmers who were aware about drone training centers such as KVKs (35.76 per cent), Sugar factories (17.21 per cent) and Agricultural Universities (15.23 per cent).

Majority of the progressive farmers (68.23 per cent) were aware that a license is needed for use of drones in agriculture. Remaining 31.77 per cent farmers did not had an idea about the requirement of license. Slightly more than one fourth of the progressive farmers (27.15 per cent) had awareness that DGCA is the only authority which gives the license for use of drones in agriculture, while the rest (72.85 per cent) of progressive farmers were not aware about the licensing authority for application of drones in agriculture. There were 68.23 per cent of the farmers that had awareness about the individuals, groups and institutions that are eligible for seeking the license and rest 31.77 per cent of the farmers did not had awareness about it.

All the farmers (100.00 per cent) were not aware about the different types of drones (fixed wing drones, multirotor drones and vertical takeoff and landing drones) that can be used for the agricultural applications. None of the farmers were aware about different capacities of drones, i.e. nano, micro, medium and large capacity drones, that were used for agricultural purposes, except 68.23 per cent progressive farmers respondents that were aware about use of small sized drones with 10 lit. capacity in agricultural applications. More than two third (68.23 per cent) farmers had knowledge about the small sized drones (10 lit capacity).

There were 68.23 per cent of progressive farmers respondents who were aware that drones can be hired for agricultural purposes. The rest 31.77 per cent of the progressive farmer respondents were not aware about the hiring of drones for agricultural purposes. Slightly higher than two-fifth of the progressive farmer respondents (42.39 per cent) knew that there were companies which provided drone services and the remaining 57.61 per cent farmers were not aware about it. The progressive farmer respondents having awareness about the companies that provided hiring services of drones for application in agriculture were UAV Drone Company (12.28 per cent), Drone Master company

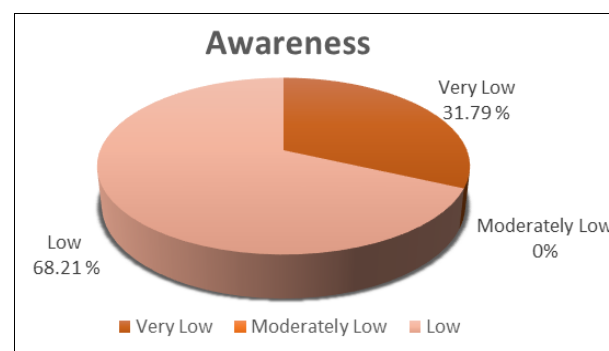
(10.60 per cent), Sanket drone company (7.95 per cent), Kirtikumar drone company (5.30 per cent) while the majority of (57.61 per cent) progressive farmers were not aware of drone service providing companies.

Majority of the progressive farmers (64.90 per cent) were aware about expenditure of application of drone technology in agriculture per acre from which 25.16 per cent of the progressive farmers had awareness about low expenditure of upto Rs. 2200/- per acre, 21.19 per cent of the progressive farmers had awareness about medium expenditure per acre of between Rs. 2201/- to Rs. 2600/- and 18.55 per cent of the progressive farmers had awareness about high level of expenditure of more than Rs. 2601/- per acre for application of drone technology in agriculture.

2. Overall awareness of progressive farmers about the application of drone technology in agriculture

Table 2: Distribution of progressive farmers according to the overall awareness about the application of drone technology in agriculture

Sl. No.	Awareness	Frequency	Percentage
1	Very low (Up to 5)	48	31.79
2	Moderately low (6 to 10)	0	0.00
3	Low (11 and above)	103	68.21
	Total	151	100.00



The Table 2 shows that 68.21 per cent of the progressive farmers had low level of awareness of drone technology application in agriculture and 31.79 per cent of the progressive farmers had very low level of awareness of drone technology application in agriculture.

Conclusion

Results revealed that 68.23 per cent of the progressive farmer were aware about spraying agro chemicals in proper manner with adequate amount and 37.38 per cent of them knew the technology behind the use of drone technology. More than a quarter (26.50 per cent) of farmers were aware about training required for use of drone technology in agriculture. More than two-third (68.23 per cent) of farmers were aware about drone training centers that is KVK (35.76 per cent), Sugar factories (17.21 per cent) and Universities (15.23 per cent). Likewise 68.23 per cent of farmers were aware about license required for using drones in agriculture. There were 27.15 per cent farmers who knew that DGCA is the only authority to grant the license for using drone technology in agriculture. Also, 68.23 per cent of the farmer respondents had awareness about who were eligible to seek the license. Again 68.23 per cent of the progressive farmers

had awareness that 10 lit. capacity drones were used for the agricultural purposes. Similar number (68.23 per cent) of farmers said that drones could be rented. The same number of farmers knew the companies that could provide drone services and that those companies were UAV (12.28 per cent), Drone Culture (5.96 per cent), Drone Master (10.60 per cent), Sanket Drone Company (7.95 per cent) and Kirtikumar Drone Company (5.30 per cent). There were 64.90 per cent of the farmers that had awareness about expenditure about application of drone technology in agriculture per acre and 25.16 per cent of farmers said that up to Rs. 2200/- was the expenditure for the per acre application of drone technology, 21.19 per cent of farmers said the range between Rs. 2201/- to Rs. 2600/- per acre and 18.55 per cent of farmers said that more than Rs. 2601/- expenditure for per acre. Again, 68.21 per cent of the farmers had low level of awareness about application of drone technology in agriculture and 31.79 per of the farmers had very low level of awareness about application of drone technology in agriculture.

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