



## Farmers' buying behaviour of herbicides and preference towards weeding operations in Tamil Nadu

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Weeds have become a constant problem in agricultural production due to resilient character. The most common method of chemical weed control is herbicides (Swanton *et al.* 2015, Ramesh *et al.* 2017). Mordor Intelligence Report (2022), indicated that during the forecast period (2020–25), the worldwide herbicide market is expected to grow at a CAGR of 2.1%. In 2019, Asia-Pacific was the largest geographical section of market, accounting majority of market share. Herbicide contamination of soil, crops and water was found to be quite minimal in Tamil Nadu (Janaki *et al.* 2019). Herbicide use in Tamil Nadu was low till late 20<sup>th</sup> century, but has grown in the last 15 years due to manpower shortages, hence need for prompt weed management arises. There is a need to understand the farmers buying behaviour and use of herbicides which could help herbicide dealers to frame suitable strategies for market growth. Hence, the present study focuses on identifying the buying behaviour and market potential of herbicides in the study area. Hence an investigation was carried out during 2021 to; analyse the farmers' buying behaviour of herbicides in Tamil Nadu; analyse the farmer's preference towards weeding operations; identify the problematic weeds in the study area.

Present study was carried out in 4 districts of Tamil Nadu, viz. Tiruppur, Salem, Dindigul and Namakkal. In each district 50 sample farmers and 12 sample dealers were randomly selected, thus a total of 200 farmers and 48 dealers were surveyed. Maximum turnover of Atrazine herbicide and its maximum area under production of maize crop were the criteria for selection of districts. The primary data were collected by interviewing directly from the sample farmers and dealers during 2021 with the help of well-organized and pre-tested interview schedule. Rank Based Quotient (RBQ), Chi Square test and Percentage analysis were used to analyse the data.

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*Demographic profile of sample farmers:* Majority of the sample farmers (35%) were young and middle aged and most of the farmers completed their secondary school education (38%). Majority of the farmers (66.50%) engaged in both on farm and off farm activities. In case of annual family income, 44% of sample farmers' had between ₹90000–200000. Majority of the farmers' (69%) had more than 15 years of farming experience. Nearly 37% of the farmers were holding less than one ha of land, which indicates that majority of the farmers were small farmers. It is evident that majority of the farmers (89%) prefer chemical weeding rather than manual weeding, since the later consumes cost and time.

Nearly 59% of the farmers apply herbicide at a regular interval of yearly once. Oyakhilomen *et al.* (2013) also supported that the household size and extension-based-know-how are significant determinants of the decision of farmers' to adopt herbicides as an alternative to manual weeding, while economic variables such as the price of herbicides, total income, and access to credit determine the level of herbicide use.

In their review paper, Kumar and Kapoor (2017) found several aspects of farmers' typical purchasing behaviour and in general, the purchasing procedure for regularly purchased inputs was less comprehensive than that for seldom purchased components. There were, however, variations in the breadth of the purchasing process for inputs in the same category (Feeney *et al.* 2019). Farmers' traits affected their purchasing decisions, and this effect was particularly pronounced in cases when agri-inputs were purchased often. For most agri-inputs, all four elements of the farmers' purchasing process were shown to be positively linked (Okello *et al.* 2019). For different agri-inputs, the farmers' purchasing procedure varies and is reliant on the farmers' characteristics.

*Problematic weeds in the farmers' field:* The farmers' perceptions of weed intensity were transformed into scores using Rank Based Quotient (RBQ). According to RBQ score, *Cyperus rotundus* (78.74) was the most prominent weed present in all the selected four districts, followed

Table 1 Association between demographic characteristics of sample farmers and farmer's existing method of weed control

Variable	Farmer's existing method of weed control		Chi-square	P-value
	Herbicides and manual weeding	Mixed herbicides		
<i>Size of landholding</i>				
<1 ha	74(37.00)	0(0.00)	104.02	.000*
1-2 ha	57(28.50)	0(0.00)		
2.1-4 ha	19(9.50)	32(16.00)		
>4 ha	7(3.50)	11(5.50)		
<i>Annual income (₹)</i>				
<90000	22(11.00)	0(0.00)	22.03	.000*
90000-200000	76(38.00)	12(6.00)		
200000-500000	52(26.00)	23(11.50)		
500000-1000000	5(2.50)	6(3.00)		
>1000000	2(1.00)	2(1.00)		
<i>Occupational status</i>				
On Farm + Off Farm	131(65.50)	2(1.00)	94.06	.000*
On Farm only	26(13.00)	41(20.50)		

\*-Significant at 1%, Figures within the parentheses indicate % to the total

Table 2 Association between demographic characteristics of sample farmers and farmers' preference towards weeding operations

Variables	Farmers' preference towards weeding operation		Chi-square	P-value
	Chemical weeding operation	Manual weeding operation		
<i>Age</i>				
25-40	63(31.50)	7(3.50)	17.90	0.001*
41-55	65(32.50)	7(3.50)		
56-70	44(22.00)	4(2.00)		
>70	6(3.00)	4(2.00)		
<i>Size of landholding</i>				
<1 ha	71(35.50)	3(1.50)	106.19	0.000*
1-2 ha	56(28.00)	1(0.50)		
2.1- 4 ha	48(24.00)	3(1.50)		
>4 ha	3(1.50)	15(7.50)		
<i>Annual income (₹)</i>				
<90000	21(10.50)	1(0.50)	38.89	0.000*
90000-200000	86(43.00)	2(1.00)		
200000-500000	64(32.00)	11(5.50)		
500000-1000000	6(3.00)	5(2.50)		
>1000000	1(0.50)	3(1.50)		
<i>Occupational status</i>				
On Farm + Off Farm	127(63.50)	6(3.00)	17.08	0.000*
On Farm only	51(25.50)	16(8.00)		

\*- Significant at 1%, Figures within the parentheses indicate % to the total

by *Trianthema portulacastrum* (71.45), *Cynodon dactylon* (69.61) and *Parthenium* (52.7).

Annual family income of sample farmers ranged between ₹90000-200000, size of landholding less than one hectares and the farmers who were engaged in on farm and off farm activities were significant at 1% level (Table 1). There exists significant association between the demographic

characteristics of the farmers and farmer's existing method of weed control.

Age category of 41-55 years, annual family income ranged between ₹90000-200000, the size of landholding less than one ha and farmers who were engaged in on farm and off farm activities had the maximum preference towards chemical weeding operations and were significant at 1% level (Table 2). It showed that there exists a high significant association between the demographic characteristics of sample farmers and farmers' preference towards weeding operations.

The data regarding the buying behaviour of the herbicides were collected by using the following 23 statements within seven variables on a five point Likert scaling technique and analysed by using the Relative Importance Index method.

From Table 3 it could be inferred that the preference to product and dealer characteristics, consultancy and shopping behaviour were the relatively most important parameters that influences the buying behaviour of the farmers. The relatively least important parameters were the brand selection, cost consciousness, credit orientation and preference to packaging. Therefore, it can be concluded that the dealers and herbicide companies should deeply focus on the preference to product and dealer characteristics, consultancy and shopping behaviour of the farmers that would increase the buying behaviour of the farmers. Parmar *et al.* (2020) revealed that the factors influencing the buying behaviour of farmers for herbicide, viz. coefficient of cropping area was found to be positive (275.30) and highly significant at a 1% level. This indicated that with an increase in cropping area, the purchase of herbicide also increased, brand image, experience were also found to be significant and have positive impact on the purchase of herbicide.

The study concluded that as majority of the farmers were engaged in both on farm and off farm activities, the adoption level of herbicides was high due time constraint. Many of the sample farmers were young and middle aged, so they were capable of undertaking any type of innovative agricultural practices. *Cyperus*, *Cynodon* and *Trianthema* were the major problematic weeds as reported by many of the sample farmers. Farmers preferred application of herbicide, since there were incidences of non-availability as well as high cost of labour force. Effectively implementing farmers contact programme to communicate the features of the brand and also alleviating the apprehensions of farmers regarding the use of herbicides are the important contributing factors for the successful promotion of the product in the market. Training programmes may have to be conducted regularly for dealers so that they could become more familiar with the

Table 3 Buying behaviour of herbicides

Factor	RII Value	Importance
<i>Brand selection</i>		
I like to buy herbicides from a reputed company.	0.848	I
I use to select the brand in accordance with the recommendation of dealer	0.779	II
I stick with a brand for number of years	0.468	III
I myself use to choose the brand	0.475	IV
<i>Buying behaviour</i>		
I buy herbicides from the same shop	0.776	I
I use to go through label before buying a herbicide	0.730	II
I make trail on efficacy of the product	0.709	III
Wherever the adjacent field are infested by same weed I use to apply the same herbicide	0.634	IV
I use to purchase the right product whatever the distance I have to travel for their purchase	0.474	V
<i>Preference to product and dealer characteristics</i>		
I use to buy from a dealer who keeps adequate information about agriculture	0.806	I
I use to buy herbicides from a dealer who behaves well	0.789	II
I consider pros and cons of applying herbicides at the time of buying	0.725	III
<i>Cost consciousness</i>		
I use to buy the genuine product whatever the price may be.	0.699	I
I usually look for the lowest possible price while buying herbicides	0.501	II
<i>Credit orientation</i>		
I pay the credit incurred for purchasing herbicides after the harvest	0.618	I
I use to buy on credit.	0.590	II
I buy herbicides if the dealer allows me to buy on credit	0.582	III
<i>Preference to packaging</i>		
I used to buy the required amount of herbicides	0.595	I
I use to buy extra amount of herbicides at a time	0.371	II
I buy a herbicide if the product is attractive	0.291	III
<i>Consultancy</i>		
I use to buy herbicides on the basis of dealer's recommendation.	0.810	I
I use to buy herbicides according to the advice of progressive farmer.	0.750	II
I use to buy herbicides in accordance with the recommendation of experts.	0.577	III

recent and advanced information of the product so that they can push up the product among the new users effectively.

## SUMMARY

Herbicides can be regarded an effective tool for managing weeds, and their effective usage can reduce weed-related production losses up to 13%. Mordor Intelligence Report (2022), indicated that during the forecast period (2020–25), the worldwide herbicide market is expected to grow at a CAGR of 2.1%. The aim of the study was to assess the buying behaviour, market potential and constraints faced by the farmers' during the purchase of herbicides. Study was carried out in selected districts of Tamil Nadu during 2021 with a sample size 200 farmers. The results of this study concluded that there is a significant association between demographic characteristics of the farmers and their preference in weeding operations at 1% significance. *Cyperus* (78.74), *Trianthema* (71.45) and *Cynodon* (69.61) were the major problematic weeds as reported by many of the sample farmers. Buying behavior of farmers' preference towards product, dealer characteristics and consultancy were the most important parameters for the buying of herbicides.

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