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Buying behaviour of farmers towards micronutrient fertilizers in Raipur district of Chhattisgarh

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Abstract

Micronutrient fertilizers correct deficiencies that limit paddy yield across central India, yet little is known about how farmers in a specific district actually buy them. This study examined the buying behaviour of farmers towards micronutrient fertilizers in Raipur district of Chhattisgarh, drawing on primary data from 120 farmers across six locations (Arang, Tilda, Abhanpur, Mana, Raipur City and Chandrakhuri) surveyed during 2025-26 through a pre-tested structured schedule and analysed by percentage and frequency distribution. Micronutrient fertilizers had reached most farmers, with 80.83 per cent reporting use and 19.17 per cent staying out, although only 27.50 per cent had ever tested their soil for micronutrients, which points to a purchase driven more by dealer contact and observed field response than by laboratory diagnosis. Zinc was the most widely used type (46.39 per cent of users), ahead of boron (29.90 per cent) and multi-micronutrient mixtures (23.71 per cent), tracking the district's paddy-dominant cropping. The user base was experienced rather than new, with 46.39 per cent using the product for four to five years, and brand behaviour was moderately loyal, as 77.32 per cent switched brands only occasionally. HDPE or woven bags were the preferred packaging (88.66 per cent), matching a mainly granular product applied at field scale. Satisfaction was high and one-sided, with 91.75 per cent of users satisfied or highly satisfied and none dissatisfied, and 92.78 per cent intending to increase future use. Among non-users, lack of awareness was the leading reason for staying out (38.10 per cent), well ahead of cost. The market therefore rests on a mature, experienced and performance-driven user base, and the main lever for further growth is awareness among non-users rather than price support.

Keywords: Buying behaviour, micronutrient fertilizers, zinc, brand loyalty, farmer satisfaction, Raipur district

Introduction

Crops need more than nitrogen, phosphorus and potassium. Micronutrients such as zinc, iron, boron, manganese and copper are taken up in small quantities, but each performs a function no other element can substitute for. Zinc activates enzymes tied to protein synthesis, boron supports cell-wall formation and grain set, and iron is needed to build chlorophyll (Alloway, 2008) ^[1]. When a soil runs short of even one of them, yield stalls in a way that no additional dose of primary nutrients can correct.

The shortfall is widespread. Cakmak (2008) ^[2] estimated that zinc deficiency affects close to half the world's cereal-growing soils, which places it well beyond a local concern. Decades of continuous cropping, the removal rather than return of crop residue, and a heavy tilt toward NPK fertilizers have drawn down micronutrient reserves over time (Alloway, 2008) ^[1]. India followed the same path. The Green Revolution secured food-grain sufficiency largely on the strength of nitrogen, phosphorus and potassium, with micronutrients an afterthought (Takkar and Mann, 1975) ^[6], and national soil surveys show the imbalance has not corrected itself, with zinc the most prevalent deficiency followed by boron (Shukla *et al.*, 2021) ^[5].

Chhattisgarh's agriculture is built almost entirely around

paddy, and the state is often called the rice bowl of central India. Continuous rice cultivation is one of the conditions most closely tied to zinc and boron depletion, since it leaves little room for the rotation or organic replenishment that would otherwise sustain micronutrient reserves. Raipur sits at the heart of this pattern, combining heavy paddy cultivation, limited crop variety and soils known to be zinc-deficient. A retail market of private firms, cooperatives and agro-dealers has grown up across the district to supply micronutrient products, and the Soil Health Card scheme, launched in 2015, was meant to turn national deficiency mapping into awareness at the level of the individual field.

Establishing that a deficiency exists is only half the question; how farmers actually buy a specialised input to correct it is the other. In agricultural input markets, buying behaviour spans several linked decisions: whether to adopt the input at all, which nutrient or type to choose, which brand to buy and how loyal to remain to it, what packaging to prefer, how satisfied the product leaves the buyer, and whether that satisfaction converts into repeat and expanded purchase. Each of these tells a different part of the story of where a market stands and where it can grow. A market held up by a large, experienced and satisfied user base calls for a different strategy from one carried by first-time triers, and the reasons

non-users give for staying out reveal whether the binding constraint is price, availability or awareness. Micronutrient fertilizers are a useful case for examining this behaviour, because their agronomic value is often less immediately visible to the farmer than that of a bag of urea, so dealer contact, social influence and accumulated field experience play a larger part in the purchase (Kumar *et al.*, 2019) [3]. Although several companies market micronutrient fertilizers in Raipur district, little location-specific evidence exists on how the district's farmers actually buy them. This study was therefore undertaken with a single objective: to examine the buying behaviour of farmers with respect to micronutrient fertilizers in Raipur district of Chhattisgarh. Buying behaviour is taken here to cover the extent of use, the type of micronutrient chosen, the duration of use, brand-switching, packaging preference, satisfaction with product performance, the intention to increase future use, and the reasons non-users give for staying out.

Materials and Methods

Study area

The study was carried out in Raipur district of Chhattisgarh, in the Chhattisgarh Plains agro-climatic zone. Raipur was selected purposively for its considerable agricultural activity, diverse cropping pattern, well-developed fertilizer distribution network and rising use of micronutrient fertilizers. Six locations within the district were covered: Arang, Tilda, Abhanpur, Mana, Raipur City and Chandrakhuri.

Sampling design and sample size

A three-stage sampling design was used. Raipur district was selected purposively in the first stage, six study locations were chosen in the second, and in the third stage 120 farmers were selected purposively. The distribution of the 120 farmers across the six locations is given in Table 1.

Table 1: Distribution of sample farmers across the six study locations

Location	No. of farmers
Arang	29
Tilda	22
Abhanpur	20
Mana	19
Raipur City	16
Chandrakhuri	14
Total	120

Source: Primary data.

Data collection

Primary data pertaining to 2025-26 were gathered through personal interviews using a pre-tested structured schedule.

Analytical tools

Collected data analysed in Microsoft Excel using percentage and frequency analysis. The percentage of respondents in a category was computed as the number in that category divided by the relevant base, multiplied by 100. Where a question allowed more than one answer, such as the type of micronutrient used or the preferred packaging, percentages were computed on the base of users and therefore sum to more than 100. Buying-behaviour variables were analysed for the user sub-sample of 97 farmers, while extent of use, socio-economic profile and cropping pattern were analysed for the full sample of 120.

Results and Discussion

Socio-economic profile of respondents

The sampled farmers were mostly middle-aged. Half fell in the 31 to 40 band (41.67 per cent) and another 40 per cent in the 41 to 50 band, so more than four-fifths were between 31 and 50 years old. Small holders dominated the land-holding profile, with 50.83 per cent farming 1 to 2 hectares, and marginal and small farmers together came to well over three-fifths of the sample. Annual farm income clustered in the ₹1 to 5 lakh range (62.50 per cent), with a further 27.50 per cent earning above ₹5 lakh and very few (1.67 per cent) below ₹50,000. On education, 45.83 per cent had completed SSC or HSC and only 6.67 per cent were illiterate, so some formal schooling was the norm, which has a bearing on how far written or technical product information can travel among these buyers (Table 2).

Table 2: Socio-economic profile of sample farmers (n = 120)

Characteristic	Category	No. of farmers	Percentage
Age (years)	15-30	14	11.67
	31-40	50	41.67
	41-50	48	40.00
	Above 50	8	6.67
Land holding	Marginal (<1 ha)	15	12.50
	Small (1-2 ha)	61	50.83
	Semi-medium (2-4 ha)	26	21.67
	Medium (4-10 ha)	13	10.83
	Large (>10 ha)	5	4.17
Annual income (₹)	Up to 50,000	2	1.67
	50,000-1,00,000	10	8.33
	1,00,000-5,00,000	75	62.50
	Above 5,00,000	33	27.50
Education	Illiterate	8	6.67
	Primary schooling	34	28.33
	SSC/HSC	55	45.83
	Graduate	19	15.83
	Postgraduate	4	3.33

Source: Primary data.

Cropping pattern

The sample's cropping pattern was strongly paddy-centred. Half the farmers grew paddy alone (50 per cent), a further 31.67 per cent grew paddy alongside vegetables, and 18.33 per cent grew vegetables only. More than four-fifths therefore

cultivated paddy in some form, which sets the agronomic backdrop for the buying behaviour that follows, since a near-monoculture in a well-researched zinc-responsive crop shapes both the type of micronutrient farmers buy and the seasonal, kharif-centred timing of that demand (Table 3).

Table 3: Cropping pattern of farmers (n = 120)

Crop(s) grown	No. of farmers	Percentage
Paddy only	60	50.00
Paddy and vegetables	38	31.67
Vegetables only	22	18.33
Total	120	100.00

Source: Primary data.

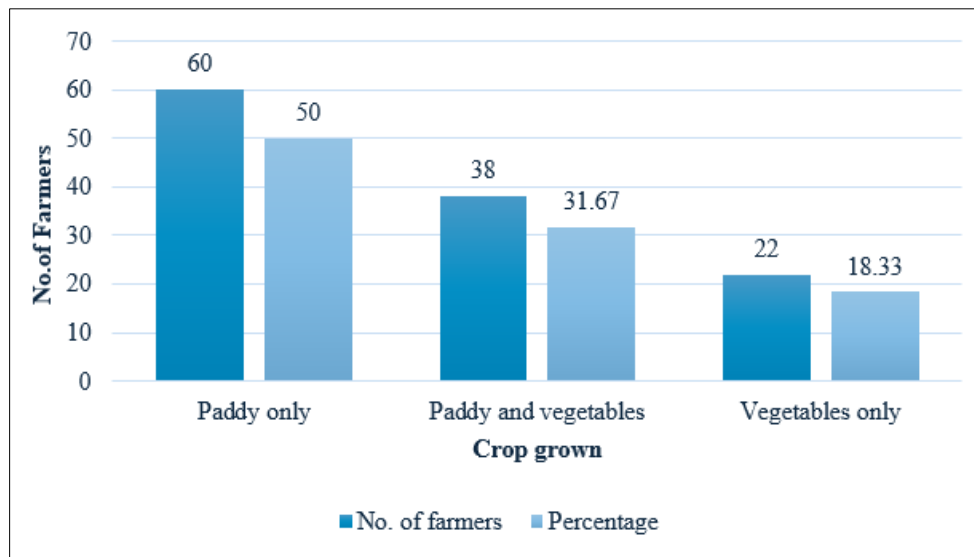


Fig 1: Cropping pattern of farmers

Extent of use of micronutrient fertilizers

Micronutrient fertilizers had reached most of the sampled farmers, with 80.83 per cent (97 of 120) reporting use and 19.17 per cent staying out. That level of penetration is high for what remains a fairly specialised input category, and it runs well ahead of the diagnostic base that would ideally support it. Only 27.50 per cent of the sample had ever had their soil tested specifically for micronutrients, even though 60.83 per cent held a Soil Health Card, so formal, farm-specific confirmation of a deficiency is clearly not the main trigger for a first purchase here. The gap between an 80.83 per cent usage rate and a 27.50 per cent micronutrient-testing

rate is the more telling number. It suggests that dealer recommendation, a neighbour's visible crop response and a general Soil Health Card reading are doing most of the work of converting farmers into buyers, ahead of any laboratory-confirmed deficiency on their own land. One consequence is that some current users may be applying micronutrient fertilizers somewhat generically rather than against a confirmed farm-specific shortfall. For reading this market it means buying behaviour is shaped at least as much by social and dealer-mediated influence as by individual agronomic diagnosis, a theme that recurs across the dimensions examined below (Table 4).

Table 4: Extent of use of micronutrient fertilizers by sample farmers (n = 120)

Category	No. of farmers	Percentage
Users	97	80.83
Non-users	23	19.17
Total	120	100.00

Source: Primary data.

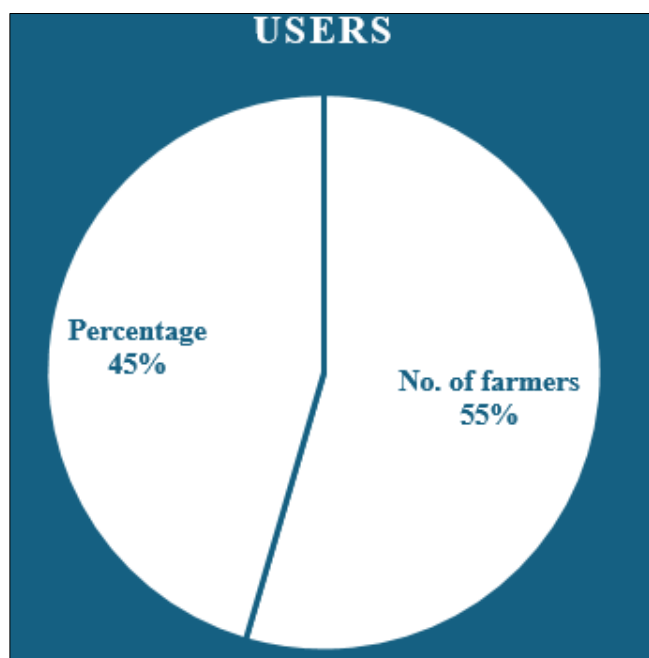


Fig 2: Shows farmers constituting 55%, compared with 45% percentage

Type of micronutrient fertilizer used

Among users, zinc alone accounted for 46.39 per cent of reported use, ahead of boron (29.90 per cent) and the multi-

micronutrient mixture (23.71 per cent). Iron, manganese and copper together came to just over 5 per cent. Because a user could report more than one product, the responses total more than the number of users, and it is the ordering rather than the sum that matters. Zinc's clear lead follows directly from the district's cropping pattern. With more than four-fifths of farmers growing paddy in some form, and zinc the micronutrient most consistently limiting to rice grown under flooded conditions, buying behaviour tracks agronomy: a paddy-dominant calendar produces a zinc-led pattern of purchase (Alloway, 2008; Cakmak, 2008) ^[1, 2]. The near-absence of iron, manganese and copper in the usage mix suggests that farmer demand for these nutrients is, for now, marginal, whether because the corresponding deficiencies are not visibly limiting locally or because farmers have not encountered suitable products (Table 5).

Table 5. Type of micronutrient fertilizer used by farmer-users (n = 97)

Type	No. of farmers	Percentage
Zinc	45	46.39
Boron	29	29.90
Multi-micronutrient mixture	23	23.71
Iron	3	3.09
Manganese	1	1.03
Copper	1	1.03

Source: Primary data. Multiple responses.

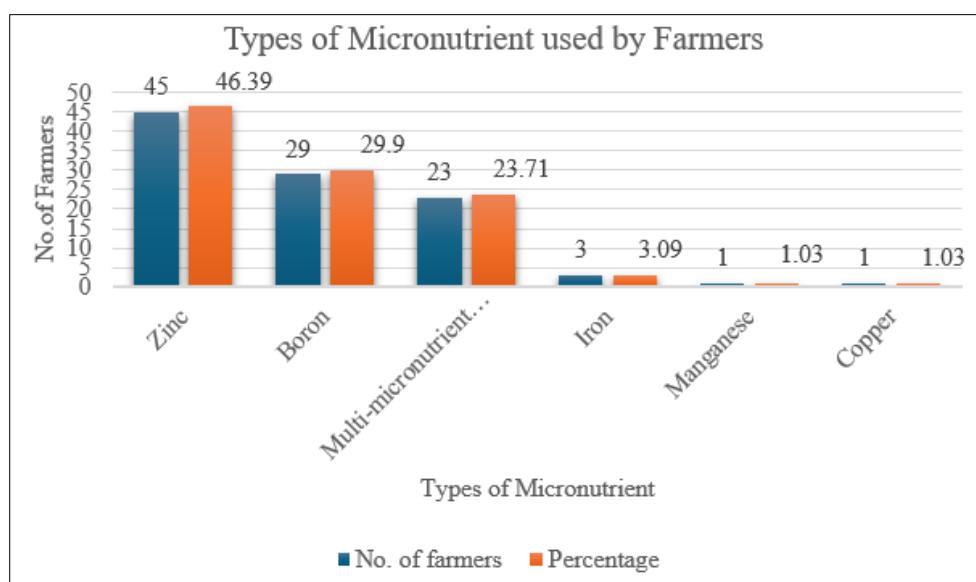


Fig 3: Types of micronutrient used by farmers

Duration of use

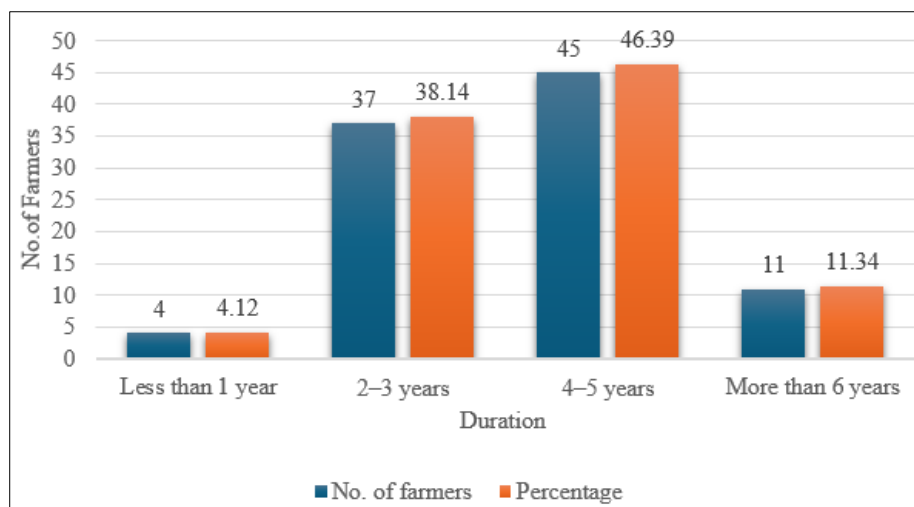
Most users were not recent converts. Nearly half (46.39 per cent) had used micronutrient fertilizers for four to five years and another 38.14 per cent for two to three years, while only 4.12 per cent had started within the past year and 11.34 per cent had more than six years behind them. An average tenure approaching four years means the market rests on farmers with several seasons of first-hand experience rather than a wave of first-time triers. This matters for how the rest of the buying-behaviour findings should be read, because a satisfaction rating or a repurchase intention reported by an experienced user carries more evidential weight than one

formed after a single trial season. Taking the four-to-five-year and over-six-year groups together, 56 of the 97 users have at least four full cropping cycles of experience, so the bulk of current demand is anchored in a repeat-purchase base. Sharma and Patel (2021) ^[4] described a similarly gradual rather than sudden rise in micronutrient demand across paddy-dominant states, which fits a market that has built up steadily rather than through a short promotional push. The corollary is that further growth, particularly among the farmers still outside the user base, is likely to need a similarly sustained effort rather than a one-off campaign (Table 6).

Table 6: Duration of use of micronutrient fertilizers among farmer-users (n = 97)

Duration	No. of farmers	Percentage
Less than 1 year	4	4.12
2-3 years	37	38.14
4-5 years	45	46.39
More than 6 years	11	11.34
Total	97	100.00

Source: Primary data.

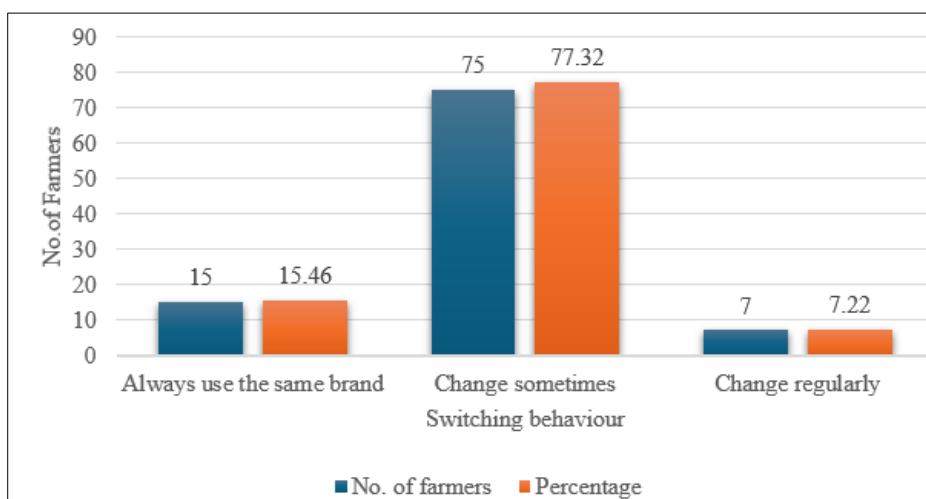
**Fig 4:** Duration of use micronutrient**Brand-switching behaviour**

Brand behaviour sat in the middle ground between rigid loyalty and free switching. Most users (77.32 per cent) changed brands only occasionally, 15.46 per cent stayed with a single brand and 7.22 per cent changed regularly. The concentration in the occasional-switching category is itself informative, since it rules out both a market locked to whichever company reached a farmer first and one in which every purchase is a fresh contest with no memory of past experience. Instead, most farmers default to a preferred brand while remaining open to switching when a product is unavailable, a dealer suggests an alternative or a competing brand shows a visibly better result. This conditional loyalty is consistent with a buyer base that weighs product

performance heavily, and it echoes Kumar *et al.*'s (2019) [3] finding that perceived crop response and price, rather than brand name, drive fertilizer purchase among North Indian farmers. For companies, it means market share is not secured simply by being first to a farmer, and continued performance and reliable availability are needed to hold custom from one season to the next (Table 7).

Table 7: Brand-switching behaviour of farmer-users (n = 97)

Behaviour	No. of farmers	Percentage
Always use the same brand	15	15.46
Change sometimes	75	77.32
Change regularly	7	7.22
Total	97	100.00

**Fig 5:** Brand switching behaviour of farmers

Packaging preference

Packaging preference followed the physical form of the product. HDPE or woven bags were preferred by 88.66 per cent of users, plastic bags by 42.27 per cent, and laminated bags and bottles or containers by only about 2 per cent each. Because farmers could name more than one acceptable format, these shares sum to more than 100 per cent. The strong tilt toward bag packaging reflects a market dominated by granular zinc, boron and multi-micronutrient formulations

applied by broadcast or basal placement at field scale, for which a bottle or small container, better suited to concentrated liquid or foliar products, offers no advantage. The practical reading for product strategy is modest but real: introducing a liquid or foliar micronutrient into this market would likely require accompanying farmer education on a different application method, since current handling habits are built around bulk granular material rather than measured liquid dosing (Table 8).

Table 8: Packaging preference of farmer-users (n = 97)

Packaging type	No. of farmers	Percentage
HDPE/woven bag	86	88.66
Plastic bag	41	42.27
Laminated bag	2	2.06
Bottle/container	2	2.06

Source: Primary data. Multiple responses

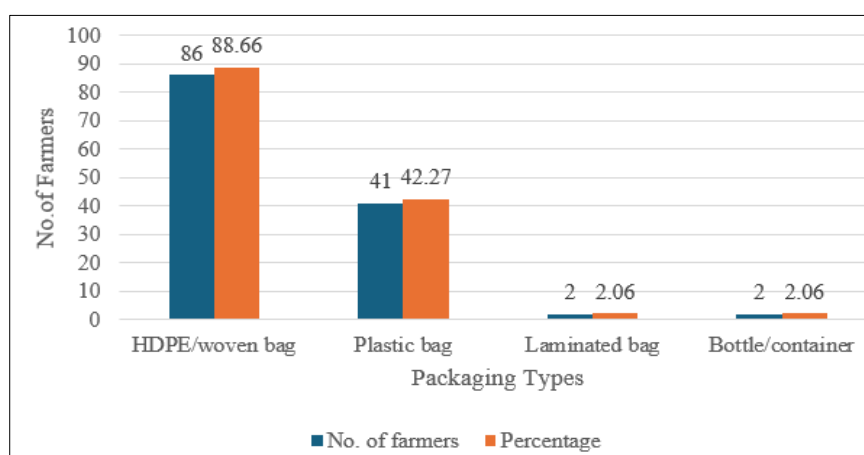


Fig 6: Packaging preference of farmer

Satisfaction with product performance

Satisfaction among users was high and one-sided. None of the 97 users reported dissatisfaction; 72.16 per cent were satisfied and 19.59 per cent highly satisfied, leaving 8.25 per cent neutral. Taking the two positive categories together, 91.75 per cent of users were satisfied or highly satisfied. The centre of opinion therefore sits solidly on the positive side, closer to plain satisfaction than to the highly satisfied extreme, which reads as a credible pattern rather than uniform enthusiasm. Two features of the sample lend weight to the

result. The mean duration of use approaching four years means this is a judgement formed over repeated crop cycles rather than a single season, and the zinc-led usage pattern means most respondents are reporting on a nutrient whose benefit in paddy is comparatively well established and therefore more likely to be visible in the field. The absence of any dissatisfaction bears directly on where the market can grow: with essentially no performance problem to overcome among existing users, the main constraint on wider uptake is unlikely to be the product itself (Table 9).

Table 9: Satisfaction of farmer-users with micronutrient fertilizer performance (n = 97)

Satisfaction level	No. of farmers	Percentage
Highly satisfied	19	19.59
Satisfied	70	72.16
Neutral	8	8.25
Total	97	100.00

Source: Primary data.

Intention to increase future use

Intention to expand use followed from the satisfaction result. Almost all users (92.78 per cent) intended to increase their future use of micronutrient fertilizers, against a single farmer (1.03 per cent) who did not and 6.19 per cent who were unsure. A user base in which effectively no one is dissatisfied would be expected to show exactly this kind of strong forward intention, and the two findings together point to a

demand-pull already operating within the existing user base, largely independent of any promotional push, since satisfied users expanding their own application generate growth that needs no new customer acquisition. If even part of this stated intention is realised in coming seasons, demand is likely to rise through heavier use among current buyers before any new adopters are counted (Table 10).

Table 10: Intention of farmer-users to increase future use of micronutrient fertilizers (n = 97)

Response	No. of farmers	Percentage
Yes	90	92.78
No	1	1.03
No idea	6	6.19
Total	97	100.00

Source: Primary data.

Reasons cited by non-users

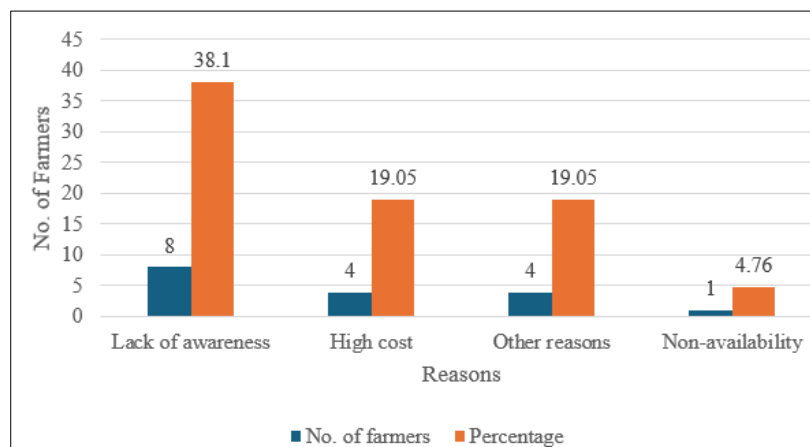
Among the non-users, the reasons given for staying out point away from price and toward information. Lack of awareness was the single largest reason (38.10 per cent), well ahead of high cost (19.05 per cent), other reasons (19.05 per cent) and non-availability (4.76 per cent). Read alongside the near-universal satisfaction and strong repurchase intention of existing users, this ordering suggests the barrier facing non-

users is not the product's merits or its affordability but simply not having been reached with clear information about it. The practical implication is direct. Because price is cited by well under a quarter of non-users, a subsidy-led approach alone would leave most of this small non-adopter segment untouched, whereas awareness-building would address the barrier that most non-users actually report.

Table 11: Reasons cited by non-users for not using micronutrient fertilizers

Reason	No. of farmers	Percentage
Lack of awareness	8	38.10
High cost	4	19.05
Other reasons	4	19.05
Non-availability	1	4.76

Source: Primary data.

**Fig 7:** Reasons cited non using of micronutrient

Conclusion

The buying behaviour of farmers towards micronutrient fertilizers in Raipur district describes a market that is already broad, mature and demand-led. Use has reached 80.83 per cent of farmers, and it rests on an experienced base, with most users applying the product for four or more years rather than trying it for the first time. Product choice is firmly zinc-led, reflecting the district's paddy monoculture, and the near-absence of iron, manganese and copper shows demand tightly focused on the nutrients that matter agronomically for rice. Brand loyalty is moderate and conditional: farmers hold a preferred brand loosely and switch when performance, availability or a dealer's advice gives them reason to, which marks them as performance-driven buyers rather than brand-driven ones. Packaging preference follows the granular form of the product. Most striking is the satisfaction profile, in which not a single user is dissatisfied and more than nine in ten are satisfied or highly satisfied, matched by an almost universal intention to increase future use. Taken together these results point to a demand-pull that is already at work

within the user base and likely to raise demand through heavier application before any new adopters are added. The one clear gap lies with non-users, whose leading reason for staying out is lack of awareness rather than price or availability. The practical message for companies, dealers and extension agencies is therefore consistent across every dimension examined: this market is held up by product performance and word of mouth, not by price, so the most direct route to widening it is sustained awareness-building among the non-adopting minority rather than subsidy alone. As no comparable district-level study of farmer buying behaviour for micronutrient fertilizers in Raipur was available, these findings offer new, locally grounded evidence for planning marketing and extension effort in the study area.

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