

RESEARCH PAPER

Market Chain Analysis of Fodder Crop Seeds in Eastern Uttar Pradesh, India

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ABSTRACT

This study examines the market chain structure and efficiency of fodder crop seed distribution in Eastern Uttar Pradesh, India, focusing on both formal and informal marketing systems. Based on primary and secondary data collected during 2022–2024, the research surveyed 600 farmers and 150 marketing chain actors across five purposively selected districts—Ayodhya, Azamgarh, Varanasi, Jaunpur, and Ballia—using a three-stage random sampling method. The study assessed productivity gaps, marketing costs, margins, and overall efficiency in the distribution of major fodder crop seeds, including jowar, bajra, maize, and berseem. Five marketing chains were identified: three formal (public and private sector-led) and two informal. Marketing Chain III (Distributors–Wholesalers–Retailers–Farmers), a formal private sector route, was the most dominant in formal seed distribution, while Chain V (Farmers’ grains–Village traders–Retailers–Farmers) played a significant role in the informal sector. Productivity analysis revealed considerable yield gaps between formal and informal seed sources: jowar (35.75%), bajra (30.25%), berseem (23.18%), and maize (15.33%), indicating the higher potential of formal seed systems. Although informal Chain V offered lower seed prices to end users, it incurred higher marketing costs and margins, particularly at the retailer level, reducing its overall efficiency. Marketing efficiency, calculated using the Acharya-Agarwal formula, was consistently higher in formal Chain III across all crops. The findings suggest that while strengthening the formal sector is important, enhancing fodder seed distribution efficiency requires promoting local seed production among large farmers, supported by assured markets and fair pricing mechanisms.

HIGHLIGHTS

- ① Productivity analysis revealed substantial yield advantages of formal seeds over informal sources for fodder crops.
- ① Marketing Chain III (formal, private sector-led) was the most dominant and efficient, with efficiency scores of jowar (3.84), bajra (2.77), maize (5.70), and berseem (5.68).
- ① Informal Chain V, while offering lower seed prices to the end users, incurred higher marketing costs and margins, resulting in reduced efficiency.
- ① Promoting local seed production among large farmers, supported by assured markets and fair pricing, is vital for enhancing seed distribution efficiency.

Keywords: Fodder productivity, Seed systems, Marketing chains, Formal vs informal sector, Seed marketing efficiency

The development of forage resources is a more complex issue than that of food and commercial crops. Due to the non-commercial nature of fodder crops, they are cultivated with minimal inputs such as water, fertilizers and labour. As a result, farmers often show limited interest in cultivating them.

Given the low productivity of farm animals and the significant gap between the availability and demand

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for green fodder, expanding fodder production in India offers considerable potential to enhance the livestock sector.

Fodder Deficit: National and Regional Trends

India currently faces deficits of approximately 11.2%, 23.4%, and 28.9% in green fodder, dry fodder, and concentrates, respectively (Chauhan *et al.* 2017). Projections indicate that by 2050, if the current pace of fodder supply expansion continues, the country will face even larger deficits—18.4% for green fodder and 13.2% for dry fodder (Singh *et al.* 2022). At the state level, Uttar Pradesh also experiences significant shortages, with deficits of around 38% in green fodder and nearly 1% in dry fodder (Government of Uttar Pradesh, 2022). Notably, regional deficits are more critical than national averages, particularly because fodder is not economically viable to transport over long distances (Satyanarayan *et al.* 2017).

Importance of Quality Seed in Fodder Production

Among all agricultural inputs required to enhance crop productivity including forages, seed remains the most crucial component (FAO, 2020; ICAR-IGFRI, 2021). The timely and sufficient availability of high-quality seeds with improved genetics is crucial to maximize the efficiency of other inputs. Therefore, increasing fodder output necessitates a reliable supply of improved varieties or hybrids of fodder seeds at affordable prices. However, it is estimated that only 15–25% of cultivated forages currently have access to high-quality seed (Chauhan *et al.* 2017). The unavailability of quality seed remains a key constraint to the adoption of improved varieties.

Challenges in Fodder Seed Production and Distribution

Fodder seed production in India is largely confined to the unorganised sector, which lacks an efficient and structured production and distribution system. This is primarily due to the large number of fodder crops and their specific adaptation to distinct agro-climatic niches (Chauhan *et al.* 2017). Given that seed is the principal determinant of productivity, promoting seed replacement should be a high priority. Nevertheless, seed production in fodder

crops is more complex and demanding than in food or commercial crops. The establishment of a successful seed production system requires both an assured market and the provision of fair prices to seed producers (Malviya *et al.* 2018).

Seed Systems and Farmer Access

In the Indian context, approximately 65% of farmers still rely on farm-saved seeds or seeds shared within their communities. The greater challenge lies in ensuring the timely availability of quality seeds, rather than in their production. India's seed delivery system comprises both formal and informal sectors (Nandi, 2024; Singh and Pal, 2021). Despite investments in the formal sector, around 60–65% of the seeds in circulation remain unlabelled, reflecting inefficiencies in the current seed delivery mechanisms and indicating significant room for improvement—particularly in the case of fodder crops (Grover and Pandita, 2019).

Given the central role of seed systems in boosting fodder productivity and the pressing need to address regional deficits, the present study aims to examine the existing seed market chains for key fodder crops in Eastern Uttar Pradesh.

DATA AND RESEARCH METHODOLOGY

The study was based on an extensive field survey and interaction with respondents (farmers and marketers). Both primary as well as secondary data were collected for this study. The primary data were collected during 2022–2024 from the farmers and various marketing chain actors using a pre-tested interview schedule.

Uttar Pradesh is divided into nine Agro-climatic zones. Of these, Eastern Plain Zone of Eastern U. P. was selected purposively following the criterion of agricultural productivity and yield gap. After the selection of agro-climatic zone, the sample districts were chosen from the sample zone (Eastern Plain Zone). The Eastern plain zone comprises 12 districts, namely Barabanki, Ayodhya including Ambedkar Nagar, Sultanpur, Pratapgarh, Azamgarh, Mau, Ghazipur, Ballia, Jaunpur, Varanasi, Chandauli and Bhadohi (86%). Out of the twelve districts in the study zone, five—Ayodhya, Azamgarh, Varanasi, Jaunpur, and Ballia—were purposively selected

based on their categorization as medium- to low-productivity districts. Verma *et al.* (2019) identified these districts as falling within a crop yield index range of 68.58 to 104.16, signifying moderate to low agricultural productivity. Further, data from ICRISAT (accessed on March 18, 2022) indicate that these districts have a substantial area under fodder cultivation, with Ayodhya (11.23 thousand ha), Azamgarh (5.93), Varanasi (5.23), Jaunpur (3.59), and Ballia (3.6) reporting notable figures. Complementing this, IGFR (2021) highlights persistent deficits in quality fodder seed supply across these districts, largely due to limited penetration of formal seed systems.

In the next step, three stages random sampling was adopted to select the Blocks, Villages and farmers. One Block with 06 villages and 120 farmers (20 farmers from each village) were selected randomly from each district for the study. Thus, the study included 5 Blocks, 30 Villages, and 600 farmers. For farmer selection, a preliminary village-level listing was conducted to identify households engaged in the cultivation of at least one fodder or green manure crop during the preceding agricultural year. Further, agencies/actors (both formal and informal) involved in the supply chain of the seed of fodder crops were identified and representative samples of various agencies/actors (wholesaler, retailer, village trader, etc.) were drawn from each district at various levels of the marketing chains. A total of 150 agencies/actors (wholesalers, retailers, village traders, etc.) were selected.

The analysis of the fodder seed market was carried out using standard marketing analytical tools as outlined by Acharya and Agarwal (2020). The following methods were used:

Marketing Costs (MC) were calculated by summing up the expenditure incurred for performing marketing functions at each stage of marketing of seeds.

Marketing Margins (MM) were calculated by subtracting the sum of purchase price and marketing cost from the selling price.

Marketing efficiency (ME) estimated using the Acharya's method, which is particularly suitable for multi-layered agricultural marketing chains.

Marketing Efficiency = $\frac{\text{Net Selling Price}}{\text{Marketing Cost} + \text{Marketing Margins}}$

RESULTS AND DISCUSSION

Productivity gap in major fodder crops

The productivity gap for major fodder crops was analyzed to highlight the advantages of formal seeds over informal ones. Jowar, bajra, maize and berseem were major fodder crops grown in the Eastern Plain Zone of Eastern Uttar Pradesh. Table 1 illustrates the crop-wise fodder area covered by formal and informal seeds. The area under fodder using formal seeds was highest for jowar (38%), followed by berseem (23.58%), bajra (22.71%), maize (10.25%), oats (4.26%), cowpea (0.45%), Napier (0.14%), and Makkhan grass (0.12%). On the other hand, the area covered by fodder using informal seeds was highest for jowar (34.20%), followed by maize (28.48%), bajra (27.88%) and berseem (9.44%). Table 1 also shows a significant gap in fodder productivity between formal and informal seeds of major fodder crops. The productivity gap between formal and informal jowar seeds was 232.99 qt./ha (35.75%). This 35.75% productivity gap in jowar suggests considerable yield improvement potential through formal seed adoption. Similarly, the gap in productivity of fodder grown using bajra, berseem and maize were 128.40 qt./ha (30.25%), 62 qt./ha (23.18%) and 64.99 qt./ha (15.33%), respectively. In the study area, informal seeds were either absent or in negligible quantity for the production of oats, cowpea, *Makkhan* grass and Napier. The significant gap in fodder production between formal and informal seeds suggests that increasing access to formal seeds could improve productivity. The substantial productivity gaps observed between formal and informal seeds (e.g., 35.75% in jowar, 30.25% in bajra) indicate the need to prioritize fodder crops in state and national seed policy frameworks.

Mapping of Marketing Chains and its share in seed distribution for major fodder crops

A commodity reaches end users from the producer through what is known as a marketing channel or chain. The study observed the marketing chains used to distribute fodder crop seeds. Five primary and widely used marketing chains for fodder seed were examined, which facilitate the transfer of seeds from source to end user (table 2). Of these, three formal and two informal chains were involved in

Table 1: Comparative analysis of production and productivity of fodder using formal and informal seeds

Crops	Using formal seeds			Crops	Using informal seeds			Productivity Gap	
	Area (ha)	Production (Qt.)	Productivity (Qt./ha)		Area (ha)	Production (Qt.)	Productivity (Qt./ha)	Qt./ha	Percentage (%)
Jowar (n = 221)	23.76	15486	651.77	Jowar	9.20	3852.76	418.78	232.99	35.75
Two cut system	(38.48)	(53.93)		(n = 115)	(34.20)	(41.33)			
Bajra (n = 95)	14.0	5950	424.40	Bajra	7.50	2220.00	296.00	128.40	30.25
	(22.71)	(20.72)		(n = 48)	(27.88)	(23.81)			
Maize (n = 45)	6.327	2682	423.90	Maize	7.66	2747.80	358.91	64.99	15.33
	(10.25)	(9.34)		(n = 22)	(28.48)	(29.47)			
Berseem (n = 224)	14.56	3792	260.00	Berseem	2.54	501.93	198.00	62.00	23.85
	(23.58)	(13.21)		(n = 39)	(9.44)	(5.38)			
Oats (n = 26)	2.63	578.6	220.00	—	—	—	—	—	—
	(4.26)	(2.02)							
Cowpea (n = 9)	0.28	70	250.00	—	—	—	—	—	—
	(0.45)	(0.24)							
Makkhan Grass (n = 3)	0.075	62	826.66	—	—	—	—	—	—
	(0.12)	(0.22)							
Napier (n = 3)	0.0875	94	1074.29	—	—	—	—	—	—
	(0.14)	(0.33)							
Total fodder	61.73	28714.6	465.16	Total fodder	26	9322.49	358.56	106.6	22.92
	(100)	(100)			(100)	(100)			

Source: As per findings based on survey 2022-24.

Table 2: Share of seed distribution through various marketing channels of fodder (sorghum, bajra, maize, berseem & oats) crops

Sl. No.	Categories	Channels	Sorghum		Bajra		Maize		Berseem		Oats	
			Quantity handled (Qt.)	Share (%)	Quantity handled (Qt.)	Share (%)	Quantity handled (Qt.)	Share (%)	Quantity handled (Qt.)	Share (%)	Quantity handled (Qt.)	Share (%)
1	Formal (Public sector)	Channel-I: Research institutions / KVKs/ Government agency - Farmers	1.24	12.01	0.09	3.85	0.40	2.1	0.58	7.4	5.73	88.97
2	Formal (Private sector)	Channel-II: Private Seed company – Farmers company/ FPO – Member & Non-member farmers	0.34	3.22	0.07	2.93	1.10	5.8	—	—	—	—
		Channel-III: Distributors/ Seed industry – Wholesalers – Retailers – Farmers/seed users	4.98	48.2	1.27	53.91	8.16	43.3	6.55	82.30	—	—
3	Informal sector	Channel IV: Farmers saved seed - farmers	0.92	8.87	0.12	4.96	1.93	10.2	0.81	10.3	0.71	11.02
		Channel V: Farmers produced grains used as seed – Village traders – Retailers - Farmers	2.86	27.7	0.82	34.35	7.27	38.6	—	—	—	—
Total			10.34	100	2.37	100	18.86	100	7.96	100	6.44	100

Source: As per findings based on survey 2022-24.

the distribution of fodder crop seeds. The formal seed distribution chains were further categorized into public and private sectors. The distribution of 88.97% of oats, 12.01% of sorghum, 7.4% of berseem, 3.85% of bajra, and 2.01% of maize was carried out through the formal public sector marketing chain (*Channel-I: Research institutions / KVKs/Government agency – Farmers*) for each respective fodder crop. Similarly, formal private sector marketing chains (*Channel-III: Distributors/Seed industry – Wholesalers – Retailers – Farmers/seed users*; and *Channel-II: Private Seed company – Farmers company/FPO – Member & Non-member farmers*) accounted 51.24% of the sorghum, 56.84 percent of the bajra, 49.1% of the maize and 82.30% of the berseem to the total quantity of seed supplied to the corresponding fodder crops.

Conversely, the informal seed sector's marketing chains (*Channel IV: Farmers saved seed – farmers*; and *Channel V: Farmers produced grains used as seed – Village traders – Retailers - Farmers*) contributed 36.57% of the seed for sorghum, 39.61% of the seed for bajra, and 48.8% of the seed for maize, 10.3% of the seed for berseem and 11.02% of the seed for oats. The formal public seed supply system was notably deficient, providing less than 10–12% of the seed used by farmers for various fodder crops except oat seed, it supplied over 90% of the total seed quantity. This necessitates revamping public seed systems and encouraging public-private partnerships for seed multiplication and distribution.

Although private sector channels dominated, seed access was limited due to multiple intermediaries. In addition, the public sector's formal channels accounted for the least quantity of the total seed distribution. As a result, the formal sector failed to play an effective role in the distribution of fodder seeds, leaving the informal sector with effective access to seeds, which eventually affects fodder productivity.

Marketing costs and Margins of major fodder seeds (jowar, bajra, maize and berseem)

To enhance the market structure for fodder seeds, it is important to investigate marketing costs, margins, and the resulting price spread of various marketing chains. The fodder seed moved from source to seed users through five marketing chains in the study area. Marketing Chain III, representing the formal

private sector, was found to be the most dominant among them, accounted for about half of total seed supplied to all fodder crops under study. Likewise, marketing chain V representing informal sector also accounted for a substantial portion of fodder seed supply in the study area. The marketing costs by chain, margins and price spread of seed of fodder crops (jowar, bajra, maize and berseem) given hereunder:

Formal – Public sector

Marketing chain I (Research institutions / KVKs/ Government agency - Farmers)

Seed suppliers and seed users were directly linked, but its stagnant nature provided a very limited seed supply of fodder crops in the study area. Hence, marketing costs and margins are not quantified.

Formal – Private sector

Marketing chain II (Private Seed company – Farmers company/FPO – Member & Non-member farmers)

Marketing chain II included farmers company/FPO in between seed suppliers (private seed company) and seed users (member or non-member). As it primarily focused on supplying grain and vegetable seeds, very little supply of fodder seeds observed. Therefore, marketing chain II was excluded from the analysis.

Marketing Chain III (Distributors/Seed industry – Wholesalers – Retailers – Farmers/seed users)

Marketing Chain III was the dominant marketing chain in the study area, as significant portion of the supply of major fodder crops seed was supplied through it. Therefore, marketing costs, margins, and price spread were estimated to assess the overall effectiveness of the chain (table 3). After examining several cost components, it was determined that the wholesalers overall marketing expenses came to ₹ 299/q for jowar, ₹ 321/q for bajra, ₹ 341/q for maize and ₹ 308/q for berseem. These accounted for 3.06%, 4.32%, 2.37%, and 2.12% of the seed users' purchase price, respectively. Loading and unloading, transportation and rent of shops/godowns were accounted for the major share of the marketing cost at wholesalers' level. Apart

Table 3: Marketing costs and marketing margins occurred in channel III (Formal - private sector) of fodder crops (sorghum, bajra, maize & berseem) seed

Sl. No.	Particulars	Sorghum		Bajra		Maize		Berseem	
		Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)
I	Distributor's sale price/ Wholesaler's purchase price	7750	79.35	5460	73.46	12250	85.07	12500	86.21
II	Expenses occurred at wholesaler's level								
	(i) Loading/unloading, transportation	106	1.08	106	1.43	106	0.74	106	0.73
	(ii) Rent of shop/ godown	78	0.79	78	1.05	78	0.54	78	0.54
	(iii) Storage loss@0.5%	38	0.38	23	0.30	43	0.30	47	0.32
	(iv) Labour charges (cleaning, grading etc.)	21	0.21	27	0.36	27	0.19	21	0.14
	(v) Packing charges	24	0.24	55	0.74	55	0.38	24	0.17
	(vi) Miscellaneous charges (electricity, license fees etc.)	32	0.32	32	0.43	32	0.22	32	0.22
	Sub-total (i to vi)	299	3.06	321	4.32	341	2.37	308	2.12
III	Margin of wholesalers	576	5.89	385	5.18	569	3.95	735	5.07
IV	Wholesaler's sales price/ Retailer's purchase price	8625	88.31	6166	82.90	13160	91.39	13343	92.02
V	Expenses occurred at Retailer's level								
	(i) Weighing, loading/unloading	50	0.51	25	0.34	41	0.28	41	0.28
	(ii) Transportation cost during buying	83	0.84	41	0.55	83	0.58	100	0.69
	(iii) Rent of shop	108	1.10	108	1.45	108	0.75	108	0.74
	(iv) Labour charges	33	0.33	50	0.67	50	0.35	33	0.23
	(v) Electricity and license fee	58	0.59	58	0.78	58	0.40	58	0.40
	(vi) Losses due to undersized seeds	133	1.36	150	2.03	108	0.75	87	0.60
	(vii) Pesticide costs	22	0.22	43	0.58	43	0.30	22	0.15
	(viii) Miscellaneous charges	21	0.21	21	0.28	21	0.15	21	0.14
	Sub-total (i to vii)	508	5.20	496	6.67	512	3.56	470	3.24
VI	Margin of Retailers	633	6.48	771	10.37	728	5.06	687	4.74
VII	Retailer's sale Price/ seed user's purchase price	9766	100	7433	100	14400	100.00	14500	100

*Indicates the proportionate share of seed user's purchase price; **Source:** As per findings based on survey 2022-24.

from this, the wholesalers' margins were ₹ 576/q for jowar, ₹ 385/q for bajra, ₹ 569/q for maize and ₹ 735/q for berseem accounted 5.89 per cent, 5.18 per cent, 3.95 per cent and 5.07 per cent of seed users' purchase price for the respective fodder crop.

At the next level of the marketing chain, retailers incurred higher marketing costs and margins than wholesalers for all fodder crops (jowar, bajra, maize and berseem). The marketing cost of ₹ 508/q for jowar, ₹ 496/q for bajra, ₹ 512/q for maize and ₹ 470/q for berseem was borne by the retailers, which was 5.20 per cent, 6.67 per cent, 3.56 per cent and 3.24 per cent of seed users' purchase price for the respective fodder crop. Major expenses borne by

retailers included losses from undersized seed, shop rent and transportation costs. Likewise, the margins earned by retailers as a percentage of the purchase price of seed users was 6.48 per cent (₹ 633/q) for jowar, 10.37 per cent (₹ 771/q) for bajra, 5.06 per cent (₹ 728/q) for maize and 4.74 per cent (₹ 687/q) for berseem.

Informal sector

Access to informal seeds of fodder crops was found to be significant level in the study area. The distribution of informal seeds for the major fodder crops was primarily done through marketing chain IV and V.

Table 4: Marketing costs and marketing margins occurred in channel IV (Informal sector) of fodder crops (sorghum, bajra, maize & berseem) seed (Value (₹/q))

Sl. No.	Particulars	Sorghum		Bajra		Maize		Berseem	
		Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)
I	Producer's sale price/ Seed user's purchase price	4000	100	3600	100	3200	100	9500	100
II	Marketing Expenses occurred at producer's level								
	(i) Labour charges (cleaning, grading etc.)	35	0.88	35	0.97	35	1.09	48	0.51
	(ii) Weighing, bagging, sewing, packing materials etc.	109	2.73	109	3.03	109	3.41	109	1.15
	Sub-total (i to ii)	144	3.60	144	4.00	144	4.50	157	1.65
III	Net price received by producer	3856	96.40	3456	96.00	3056	95.50	9343	98.35

*Indicates the proportionate share of seed user's purchase price; **Source:** As per findings based on survey 2022-24.

Marketing chain IV (Farmers saved seed – farmers)

Through marketing chain IV, seeds of sorghum, bajra, maize, and berseem were supplied directly to farmers by producers, but the seed producers typically supplied seeds only to their neighbours or nearby farmers, resulting in only a proportionately small quantity being supplied through this chain. In this marketing channel, the seed producer had to bear the marketing cost of ₹ 144/q for jowar, bajra and maize while ₹ 157/q quintal for berseem (table 4). The majority of forage seeds were exchanged among farmers through informal, non-monetary transactions.

Marketing chain V (Farmers produced grains used as seed – Village traders – Retailers - Farmers)

Chain V was an important marketing chain for distributing informal seeds of major fodder crops from their producers to seed users accounted for 27.7%, 34.35%, and 38.6% of the total seed distributed for jowar, bajra and maize, respectively (table 2). It was observed that grains of jowar, bajra and maize were produced by producer and sold to village traders. Village traders sanitized, graded, and bagged the grains before selling them to retailers. The grains of jowar, bajra and maize were sold as seed by retailer to seed users in the study area.

Table 5 shows that the expenses borne for various activities by village traders as a percentage of seed

users purchase price was 3.86 per cent (₹ 229/q) for jowar, 3.42 per cent (₹ 179/q) for bajra and 3.32 per cent (₹ 188/q) for maize. Losses during transportation and storage were the highest cost component at the village trader level. Similarly, the margins of village traders were 11.32 per cent (₹ 671/q) for jowar, 16.46 per cent (₹ 861/q) for bajra and 21.43 per cent (1212/q) for maize. On the other hand, retailers incurred costs amounting to 12.88 per cent (₹ 764/q), 14.49 per cent (₹ 758/q) and 13.76 per cent (₹ 778/q) of cost proportionate to the price paid by seed users for jowar, bajra and maize respectively. Similarly, retailers' margins as a percentage of the price paid by seed users were 17.98 per cent (₹ 1066/q) for jowar, 23.56 per cent (₹ 1232/q) for bajra and 20.81 per cent (₹ 1177/q) for maize.

Marketing efficiency of the marketing chains for fodder crops seeds

Marketing efficiency of chain III (formal) and chain V (informal) were estimated. Table 6 shows that formal chain III was more efficient than informal chain V for all fodder crops seed. Marketing efficiency, calculated using the Acharya-Agarwal formula, for Marketing Chain III was 3.84, 2.77, 5.70 and 5.68 for jowar, bajra, maize and berseem respectively. In contrast, marketing efficiency was 1.17, 0.73, and 0.69 for jowar, bajra, and maize, respectively. Despite lower seed prices in informal chains, higher marketing costs and margins reduced efficiency. The higher marketing efficiency in formal Chain III highlights the potential of structured

Table 5: Marketing costs and marketing margins occurred in channel V (Informal sector) of fodder crops (sorghum, bajra, maize & berseem) seed

Sl. No.	Particulars	Sorghum		Bajra		Maize	
		Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)	Value (₹/q)	*Share (%)
I	Producer's sale price/ Village trader's purchase price	3200	53.96	2200	42.07	2300	40.67
II	Expenses occurred at Village trader's level				0.00		
	(i) Loading/unloading, transportation	22	0.37	22	0.42	22	0.39
	(ii) Rent of shop/ godown/storage etc.	13	0.22	13	0.25	13	0.23
	(iii) Losses during transportation and storage @5%	160	2.70	110	2.10	115	2.03
	(iv) Labour charges (sanitation, grading, bagging etc.)	34	0.57	34	0.65	38	0.67
	Sub-total (i to iv)	229	3.86	179	3.42	188	3.32
III	Margin of Village traders	671	11.32	861	16.46	1212	21.43
IV	Village trader's sales price/ Retailer's purchase price	4100	69.14	3240	61.95	3700	65.43
V	Expenses occurred at Retailer's level				0.00		
	(i) Weighing, loading/unloading, packing materials	234	3.95	234	4.47	234	4.14
	(ii) Transportation cost during buying	100	1.69	100	1.91	100	1.77
	(iii) Rent of shop/godown	156	2.63	156	2.98	156	2.76
	(iv) Labour charges	103	1.74	103	1.97	103	1.82
	(v) Electricity and license fee	74	1.25	68	1.30	88	1.56
	(vi) Pesticide costs	97	1.64	97	1.85	97	1.72
	Sub-total (i to vi)	764	12.88	758	14.49	778	13.76
VII	Margin of Retailers	1066	17.98	1232	23.56	1177	20.81
VIII	Retailer's sale Price/ Seed user's purchase price	5930	100	5230	100	5655	100

*Indicates the proportionate share of seed user's purchase price; **Source:** As per findings based on survey 2022-24.

Table 6: Marketing index of fodder crops seed (₹/q)

Particulars	Marketing Chain III (formal)				Marketing Chain V (informal)		
	Jowar	Bajra	Maize	Berseem	Jowar	Bajra	Maize
Producer/ Distributor's net price	7750	5460	12250	12500	3200	2200	2300
Marketing cost	807	817	853	778	993	937	966
Marketing margins	1209	1156	1297	1422	1737	2093	2389
Seed user's price	9766	7433	14400	14500	5930	5230	5655
Price spread	2016	1973	2150	2200	2730	3030	3355
Marketing efficiency (Acharya-Agarwal formula)	3.84	2.77	5.70	5.68	1.17	0.73	0.69

Source: As per findings based on survey 2022-24.

supply systems in improving cost-effectiveness. The dominance of inefficient informal marketing chains (e.g., Chain V) with low marketing efficiency (0.69 to 1.17) and high margins justifies the need to institutionalize informal systems through certification, training, and infrastructure support.

CONCLUSION

The study investigated the marketing costs, margins, price spread and consequently the efficiency of various marketing chains of fodder crop seeds. Fodder seeds produced by the formal sector were

primarily distributed through Marketing Chain III (*Distributors/Seed industry – Wholesalers – Retailers – Farmers/seed users*). It was determined that the wholesalers' overall marketing expenses came to ₹ 299/q (3.06%) for jowar, ₹ 321/q (3.06%) for bajra, ₹ 341/q (4.32%) for maize and ₹ 308/q (2.12%) for berseem in the marketing chain III. Loading and unloading, transportation and shops/godowns rent accounted major portion of the marketing cost at wholesalers' level. Similarly, the marketing cost of ₹ 508/q (5.20%) for jowar, ₹ 496/q (6.67 %) for bajra, ₹ 512/q (3.56%) for maize and ₹ 470/q (3.24 %) for berseem was incurred by the retailers. Major expenses borne by retailers included losses from undersized seed, shop rent, and transportation costs. Retailers incurred higher marketing cost and margins than wholesalers for all fodder crops (jowar, bajra, maize and berseem).

Marketing Chain V (*Farmers produced grains used as seed – Village traders – Retailers - Farmers*) played a significant role in distributing informal fodder seeds, particularly for jowar, bajra, and maize. It was observed that the grains of jowar, bajra and maize were produced by producer and sold to village traders (Chain V). Village traders sanitized, graded, and bagged the grains before selling them to retailers. The grains of jowar, bajra and maize were sold as seed by retailer to seed users in the study area. The costs incurred by village traders as a percentage of seed users purchase price was 3.86 per cent (₹ 229/q) for jowar, 3.42 per cent (₹ 179/q) for bajra and 3.32 per cent (₹ 188/q) for maize. Losses during transportation and storage accounted proportionately higher cost among all costs at village traders' level. On the other hand, retailers incurred 12.88 per cent (₹ 764/q), 14.49 per cent (₹ 758/q) and 13.76 per cent (₹ 778/q) of cost proportionate to price paid by seed users for jowar, bajra and maize respectively. It was further found that formal chain III is more efficient than informal chain V for all fodder crops seed. Although seed prices were lower in Chain V compared to Chain III, the informal chain was comparatively inefficient due to higher marketing costs and margins incurred. Therefore, it may be concluded that to ensure the efficient functioning of fodder crop seed distribution systems, it is required to promote the seed production at local level particularly among large farmers level with an assured market and reasonable prices for the produced seeds.

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