

Market Trends and Price Fluctuations of Bhilawa Seed (*Semecarpus anacardium*) in Central India

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ABSTRACT

Semecarpus anacardium, commonly known as marking nut or Bhilawa, is a versatile member of the Anacardiaceae family, recognized for its multifaceted medicinal properties and industrial applications. The study explores the wholesale market trends of *Semecarpus anacardium* (marking nut or Bhilawa) in Central India from 2010 to 2021. Primary data from Market Information Service quarterly surveys and trader interviews were undertaken. The study reveals temporal and regional price variations. Statistical tools like linear regression, coefficient of variation, and annual changes delineate price movements and market-specific variations in Bhilawa seed prices. Significant fluctuations occurred in 2012 and 2020, with a notable decline in 2016 across all markets. Market-specific variability, notably lower in Katni compared to Dhamtari, Mandla, and Betul, highlights distinct price volatility. Price trajectories across regions, particularly in Katni and Dhamtari, underscore their pronounced fluctuations and substantial price hikes in specific years. This in-depth analysis serves as a valuable resource for understanding the economic, market behavior, and influencing factors shaping Bhilawa seed trade. The findings contribute to an enhanced comprehension of the intricate pricing patterns, aiding stakeholders, traders and policymakers.

Keywords: *Semecarpus anacardium* Linn, Medicinal plant, Price trends, Markets, Price variation

INTRODUCTION

Semecarpus anacardium also known as marking nut, dhobi nut, bhilawa, and biba, is a member of the Anacardiaceae family. One of the most useful and popular herbs for home remedies (Bhoir) [1]. It is a moderately sized deciduous tree, reaching up to a height of 12-15 meter and girth of 1.25 meter. Bark is rough, dark brown in color. Leaves are large, simple, ovate-oblong and 9.0-30.0 cm long, curvaceous covered with five pale pubescence. The flowering begins in the monsoon during June-July and the fruits start ripening during November - January (NMPB, 2016) [2].

Fruits, seeds and bark are used for various ethnomedicinal purposes. Fruits are used as astringent, anti-inflammatory, antitumor. Also used in rheumatoid arthritis and for the treatment of tumors and malignant growth whereas seeds yield bhilawa nut shell liquid used for marking. Bark is astringent in nature and it exudes gum resin used in leprosy infection. The stem yields, by tapping, an acrid, viscid juice from which a varnish is prepared (Sukhadiya) [3]. The fruits are also used as a dye. Kernel oil is used as lubricant as well as wood preservative against termites (Sukhadiya, Bhattarai and Gouthaman) [3-5]. Externally, the oil, mixed with coconut or sesame oil, is applied on wounds and sores to prevent the pus formation. It soothes and heals the cracked

feet, when mixed with Sal (*Shorea robusta*). For better healing of wounds, it works well, when medicated with garlic, onion and ajavayana in sesame oil (Sukhadiya) [3].

Seed oil is used for various industrial purposes such as a floor dressing; as additive substance to lacquers, dyes, and insulating material; in the plastics industry; for regenerating rubber materials; and to protect wood from white ants (Bhattarai and Uphof 1959) [4,6].

Semecarpus anacardium is a commonly used Ayurvedic medicinal plant. Their different parts including nuts, have various medicinal properties to treat clinical ailments such as vitiligo, inflammation, microbial infection, geriatric problem, baldness and neuro-related problems (Singh) [7] The fruits and its oil (28-36%) have medicinal property. The fruits are

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traditionally used for astringent, rubefacient, counter irritant and aphrodisiac properties. Juice of the fruit pericarp is used for marking cotton clothes. Noticeable impact observed in heart related illness, cancer, etc. (NMPB, 2016, Bhattarai and Sharma) [2,4,8].

Plant is distributed at the outer Himalayas from Sutlej to Sikkim and fairly at hotter parts of India as far as east of Assam. The tree is not found under cultivation but is common in forests often found occurring with Sal (Sukhadiya and NMPB 2016) [3,2]. It is frequent in dry deciduous forests of central India. A full-grown tree produces 25-45 kg fruits/tree/annum (Sukhadiya) [3].

METHODOLOGY

The primary data on wholesale market prices were collected from the on-going Market Information Service (MIS) project which undertakes quarterly market surveys in selected markets where Bhilawa seed occur in good quantity. Quarterly price data was averaged out to find the prevailing rates in different markets (Bhatnagar) [9]. Variations in prices for the period 2010-2021 were also studied.

Price Analysis

The main aim of the study was to analyze price trends and to identify variations and long-term market patterns. Market surveys were done at regional and district level markets and price data was collected over a period of 12 years from various markets ranging from regional to district level. These prices were collected on a quarterly basis. The prices used for study are wholesale market rates. The price trend graphs were drawn for each market. The criteria for assessing the price trend given below (Table 1).

Table 1. The criteria for assessing the price trend.

Annual Price change (in percentage)	Price trend
Decrease	Declining
1-15%	low
16-30 %	Moderate
31-51 %	High
above 51 %	Very high

To analyze price trends with a view to understand the pattern of growth, stability or decline of the species, price growth rate was calculated in percent.

Simple linear regression analysis was done with one independent variable and one dependent variable to find the direction of trend. In this study, the variables which were taken are the wholesale price of Bhilawa seed as an independent variable ‘x’ and the yearly period as a dependent variable ‘y’. Thus, simple linear regression

expressed as $y=a+bx$, where ‘a’ is the coefficient, ‘b’ is the intercept ‘I’, ‘x’ is the variable and ‘y’ is the predicted concentration. To assess the extent of year to year price variation in different markets, a coefficient of price variation has been calculated. Statistical analysis of results was done using MS excel. A sample of traders were interviewed to understand the present trade of Bhilawa seed.

Market prices were compiled from 2010 to 2021. This data of regional and district level markets was (2010-2021) analyzed with the following assumptions.

- Prices of medicinal plants have seasonal variations, hence for the purpose of present study the average price prevailing in the market during the year has been taken.
- The market prices were deflated using the wholesale Price Index. This adjusted the inflation during the year.

The analysis framework included factors affecting Bhilawa seed across different markets, the geographical variations on prices.

RESULT AND DISCUSSION

Tables 2 & 3 presents a detailed price analysis of Bhilawa seed across important markets in Central India over a 12-year period from 2010-14 and 2015-2021. The data reveals interesting insights into the pricing dynamics, regional variations, and temporal fluctuations in Bhilawa seed wholesale prices. This analysis is crucial for understanding the economic aspects of Bhilawa seed trade and market.

Table 2. Statistical analysis of prices of Bhilawa seed at different market levels (2010-14) (Rs. /qtl).

Year	Katni	Dhamtari	Mandla	Betul
2010	650	430	690	680
2011	1130	1090	1180	1150
2012	1400	1930	1630	1340
2013	1460	1350	1300	1650
2014	1180	1230	1290	1310
Mean	1164	1206	1218	1226
SD	320	539	340	355
CV	27.5	44.7	27.9	28.9

Mean market price of Bhilawa seed from the year (2010-14), in different markets varied from Rs. 1164 /qtl in Katni, Rs. 1206/ qtl in Dhamtari (C.G.), Rs. 1218/ qtl in Mandla and Rs. 1226 /qtl in Betul market (Table 2).

Table 3. Statistical analysis of prices of Bhilawa seed at different market levels (2015-21) (Rs. /qtl).

Year	Katni	Dhamtari	Mandla	Betul
2015	2015	1180	1230	1290
2016	2016	750	690	810
2017	2017	970	870	1080
2018	2018	880	970	780
2019	2019	870	1100	1100
2020	2020	1450	1400	1650
2021	2021	1650	1580	1600
Mean	1107	1120	1187	1004
SD	335	309	347	242
CV	30.2	27.6	29.2	24.1

Mean market price of Bhilawa seed from the year (2015-2021) in different markets varied from Rs. 1107 /qtl in Katni, Rs. 1120/ qtl in Dhamtari (C.G.), Rs. 1187/qtl in Mandla and Rs. 1004/qtl in Betul market (**Table 3**).

The standard deviation values representing the variability or spread of Bhilawa seed prices in different markets in the years 2010 to 2014 and 2015 to 2021 was taken. In the earlier period (2010-2014), the standard deviation values were 320 for Katni, 539 for Dhamtari, 340 for Mandla and 355 for Betul. Similarly, in the subsequent period (2015-2021), these values remain consistent at 335 for Katni, 309 for Dhamtari, 347 for Mandla, and 242 for Betul (**Tables 2 & 3**).

The coefficient of variation (CV) of Bhilawa seed prices from 2010 to 2014, Bhilawa seed prices ranged between 27.5 and 44.7 across different markets. Katni exhibited the lowest variation at 27.5 while Dhamtari showed the highest at 44.7 Mandla and Betul experienced variations of 27.9 and 28.9 respectively, during this period. In the subsequent timeframe from 2015 to 2021, the CV of Bhilawa seed prices fluctuated within a slightly different range. Katni saw an increase to 30.2, whereas Dhamtari decreased to 27.6 Mandla showed a minimal increase to 29.2, while Betul had the lowest variation at 24.1.

Figures 1 & 2 provides Bhilawa seed prices across four different markets - Katni, Dhamtari, Mandla, and Betul-over a span of twelve years, from 2010 to 2021.

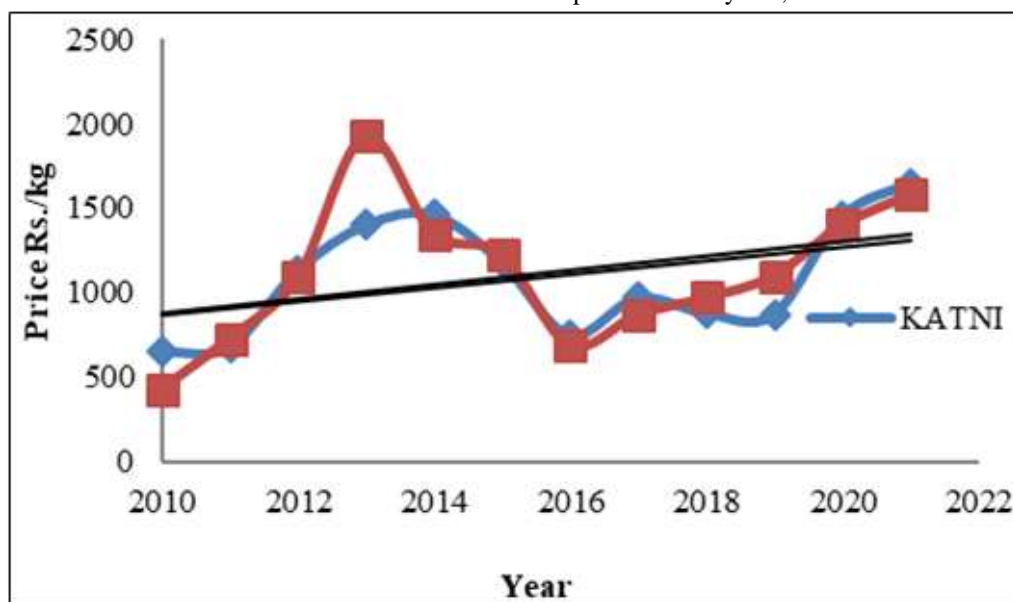


Figure 1. Price movement and trend of Bhilwa seed (*Semecarpus anacardium*) in regional markets Katni (M.P.) & Dhamtari (C.G.).

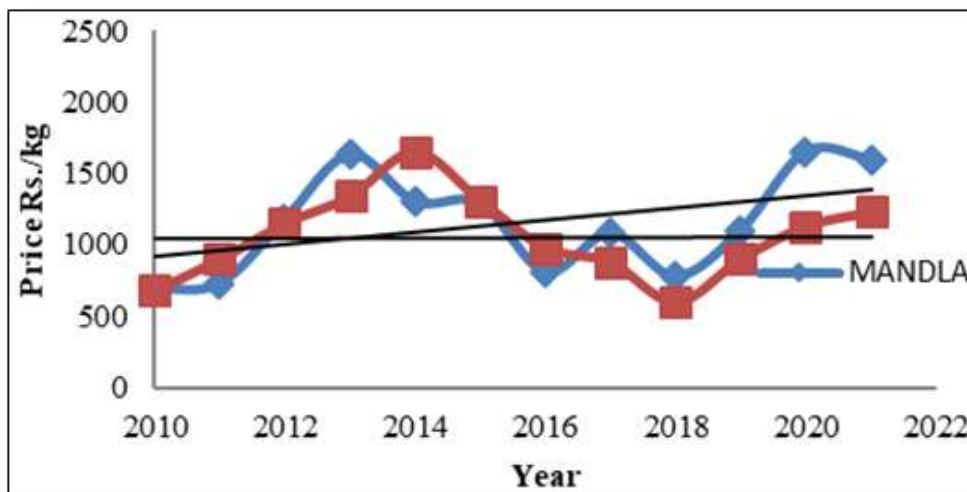


Figure 2. Price movement and trend of Bhilwa (*Semecarpus anacardium*) in district markets Mandla & Betul (M.P.).

In 2010, prices ranged from Rs. 430 /qtl in Dhamtari to Rs. 690 /qtl in Mandla, with Katni at Rs. 650/qtl and Betul at Rs. 680/qtl. Over the years, substantial fluctuations were observed. Notably, in 2012, prices surged considerably in all markets, reaching their peaks in Katni at Rs.1130 /qtl, Dhamtari at Rs.1090 /qtl, Mandla at Rs.1180 /qtl and Betul at Rs.1150 /qtl.

2013 saw fluctuations, with prices varying between Rs. 1340/qtl in Betul to Rs. 1930/qtl in Dhamtari. However, by 2016, prices had dropped significantly across all markets, with Katni at Rs. 750/qtl, Dhamtari at Rs. 690 /qtl, Mandla at Rs. 810/qtl, and Betul at Rs. 980 /qtl.

From 2017 to 2019, there were fluctuations across the markets, with varied price movements in each region. For instance, Katni rose to Rs. 970/qtl in 2017 and then dropped to Rs. 870/qtl in 2019. Dhamtari, on the other hand, fluctuated between Rs. 870/qtl and Rs. 1100/qtl during these years.

The year 2020 exhibited a significant rise in prices across all markets, with Katni at Rs. 1450/qtl, Dhamtari at Rs. 1400/qtl, Mandla at Rs. 1650/qtl, and Betul at Rs. 1130/qtl. Finally, in 2021, prices slightly varied, with Katni at Rs. 1650/qtl, Dhamtari at Rs. 1580/qtl, Mandla at Rs. 1600/qtl, and Betul at Rs. 1230/qtl.

Price Growth Rate

Table 4 presents the annual percentage changes in prices of Bhilawa seeds across four different regions-Katni, Dhamtari, Mandla, and Betul-over a span of eleven years from 2010 to 2021.

The data reflects fluctuating price trends over this period. Katni witnessed significant fluctuations, starting at 5% in 2010-2011, peaking at 154% in 2020-2021, and experiencing a considerable variation in between. Dhamtari

also had noticeable variations, with the highest increase of 267% in 2019-2020.

Table 4. Annual prices change in Bhilawa seed (in per cent).

Year	Katni	Dhamtari	Mandla	Betul
2010-2011	5	70	6	32
2011-2012	66	49	62	28
2012-2013	24	77	38	17
2013-2014	4	-30	-20	23
2014-2015	-19	-9	-1	-21
2015-2016	-36	-44	-37	-25
2016-2017	29	26	33	-10
2017-2018	-9	11	-28	-32
2018-2019	-1	13	41	50
2019-2020	67	27	50	26
2020-2021	14	13	-3	9
2010-2021	154	267	132	81

Mandla showed more moderate changes, ranging from a decrease of 20% in 2013-2014 to an increase of 132% in 2019-2020. Betul experienced a mix of negative and positive changes, with the highest increase at 81% in 2020-2021.

CONCLUSION

The comprehensive analysis of Bhilawa seed prices across distinct markets in Central India from 2010 to 2021 reveals intricate trends within the Bhilawa seed market.

The mean prices exhibited diverse trajectories across markets in different periods. Notably, the earlier years (2010-2014) saw relatively higher mean prices compared to the subsequent years (2015-2021). The substantial variation between markets, as evidenced by mean prices ranging from Rs. 1107/qtl to Rs. 1226/qtl for Bhilawa seeds and Rs. 1004/qtl to Rs. 1218/qtl for Bhilawa seeds, signifies the influence of locality on pricing dynamics.

The standard deviation values remained relatively consistent across different periods but varied significantly among markets. Dhamtari displayed the highest standard deviation in the earlier period, indicating wider price fluctuations, while Betul showcased lower variability, reflecting a more stable pricing trend. Interestingly, in the subsequent period, Betul continued to exhibit the least variation, showcasing market stability despite temporal price shifts.

The annual percentage changes elucidate the magnitude of price fluctuations annually. Katni and Dhamtari emerged as regions experiencing substantial oscillations, with spikes and drops in prices over the years, signifying higher market volatility. Conversely, Mandla and Betul depicted more tempered changes, with fluctuations within relatively moderate bounds.

The price trends, especially the dramatic surge in 2012 followed by a significant drop in 2016 and subsequent fluctuations until 2021, underscore the intricate interplay of factors influencing forces, such as demand-supply, climatic variations, and economic factors.

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