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Commodity Futures Markets
An Assessment**

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Summary

India is witnessing a fundamental change in its agricultural sector. Since the introduction of futures markets in 2003, it has seen advances in productivity, farm price realization, infrastructure modernization, and risk management capabilities. By allowing its exchanges to flourish in a free market environment, India has enjoyed greater success in agricultural product creation and markets integration than any other country.

This report examines the role of futures contracts as risk management tools for producers in three commodities: potatoes, mentha oil, and cardamom. One is a low-cost staple; the other two are highly prized for their sensory qualities and medicinal traits. Because potato futures have had limited success on other exchanges around the world, and mentha oil and cardamom are novel futures contracts, the findings shed new light on how Indian exchanges are making breakthroughs in product development and marketing.

The story of these three futures markets contracts reveals significant benefits to producers and other value chain participants. These benefits include improvements in marketing alternatives, price stability, and income increases for farmers. In addition, these and other futures markets contracts are enhancing agricultural infrastructure through expanded warehousing and reliable grading. Although further improvements are required to increase benefits to farmers, this study offers an exemplary case of how futures markets can power rural development.

Introduction

India is an agricultural giant. With three-fifths of its population engaged in agriculture, India's farm output generates over 20 % of its GDP, and ranks second only to China. Following the trend of many emerging markets that experienced strong economic growth and capital markets expansion since 1990, the government of India (GOI) permitted futures trading in multiple commodity products in 2003. This far-reaching measure paved the way for agricultural product development. With the creation of modern electronic exchanges using *best practices*, futures markets saw rapid growth from the onset, attaining industry wide support in a broad spectrum of commodity products. In a tribute to India's historic success in boosting cereal production during the 1960's, some visionary risk management experts are proclaiming this new era "India's Second Green Revolution."¹

¹ *Commodity Exchanges: Initiating India's Second Green Revolution*, D.G. Prasad and Ritambhara Singh.

I. Potatoes

On a consumption basis, potatoes rank fourth among the world's food crops. Containing both protein and carbohydrate, potatoes earn praise as the "best all-around bundle of nutrition known to mankind." They hold more nutritional value - including significant amounts of vitamin C and the mineral potassium - than the primary cereal crops of wheat, maize and rice. In addition, a potato field produces more energy per hectare per day than any other crop.² Because potatoes can be grown on any elevation, in a wide variety of soils and mature in as little as 60 days, they are regarded as the world's most efficient means for converting plant, land, water, and labor into highly edible food.

Indian potato markets

India is the third largest potato producer in the world, after China and Russia, with a total production in 2005-2006 of approximately 26 million metric tons (MT). While Europeans have grown potatoes since importing them from South America in the 16th century, India has a relatively short history of potato farming. Harvesting only 2,400 MT in 1960, India has registered an eleven-fold production increase in less than five decades - the result of both greater area cultivation and a nearly three-fold improvement in yield. According to the IIM Lucknow Report (IIM LR), the states of Uttar Pradesh, West Bengal, and Bihar account for 80% of India's potato production. Uttar Pradesh is the largest growing area, producing over a third of the crop. Comprising about 35% of all vegetable production on a tonnage basis, potatoes are primarily a winter season (rabi) crop stored in refrigerated warehouses between mid-March and mid-October. The report suggests that despite rapid growth of the Indian potato market, ample room for expansion still exists, driven by emerging markets per capita consumption³ and domestic demand for processed potato snacks. The ubiquitous potato chip market, which accounts for 85% of global snack food revenue, is being fueled in India by rising incomes and greater processing capacity. As this capacity increases, the IIM LR envisions India becoming a major packaged chip exporter.

Supply Chain and Marketing Channels

Potatoes are an attractive cash crop for farmers. The Gol provides no minimum price supports or income subsidies for potato producers except for fixing the cold storage rates for each season, making potato marketing a private sector activity. The profitability of farming varies widely depending primarily on farm size, credit availability, and storage access. Most farmers fall into one of three categories – marginal (less than

² Professor K.G. Sahadevan, *Advantages of Commodity Futures Trading Through Electronic Trading Platform for Farmers of Uttar Pradesh: A Study of Potato and Mentha*, IIM Lucknow Report.

³ Per capita consumption in emerging markets is about a quarter to a third of the developed world.

one hectare⁴), small (one to two hectares), and medium (two to ten hectares); and have poorer price realization than farmers with large scale operations and with storage readily available. Without storage, most producers sell their crop at distressed prices during harvest time, creating half of the marketable surplus. Unlike cereal crops that can be stored safely on the ground when warehouses reach capacity at harvest, potatoes are perishable. Therefore, they are subject to steep discounts when warehouses become full. Producer price realization is further hampered by severe constraints on credit. According to the IIM LR, nearly half of the respondents in Andhra Pradesh and UP had informal borrowing rates as high as 48% and that only 21% had access to formal credit lines. Finally, since potato marketing is disorganized and fragmented, small producers have little pricing power.

Large scale farmers (more than 10 hectares), however, realize hefty profits as detailed by the chart below. Storage is the critical factor in adding to their profitability since it equates to about 50% of their margin. Potato storage, however, can be risky without the ability to forward contract or hedge. And, factors such as interest expenses, spoilage, bagging, and transportation costs can significantly squeeze margins for those having to rent storage. Cold storage has steadily increased as shown by the cold storage capacity chart in UP.

Estimated Average Expenses per Hectare - Potatoes

Particulars	Expenses (Rs)
Seed	12,000
Fertilizer	4,000
Irrigation (6 times @Rs.1500/-for each)	9,000
Insecticides and pesticides	1,800
Labor, tilling and digging charges	3,000
Lease charges (@1500/bigha; 1 acre = 6.4 bigha)	9,600
Incidentals	7,000
TOTAL	46,400
Production MT	15
Storage cost (@90/quintal)	13,500
VALUE (650/quintal during October 2006)	97,500

Source: IIM LR

⁴ A hectare is 2.47 acres

Year	No of cold Storages	Storage Capacity in Lakh tons	Potato Production (in Lakh tons)	Total Storage (in Lakh tons)
1999-2000	948	59.73	101.09	50.34
2000-2001	1005	60.31	83.98	36.9
2001-2002	1011	61.66	95.7	45.22
2002-2003	1040	65.5	102.21	62.48
2003-2004	1085	72.73	88.25	50.69
2004-2005	1155	78.89	98.21	58.43
2005-2006	1205	83.65	100.86	60.65

Source: IIM LR

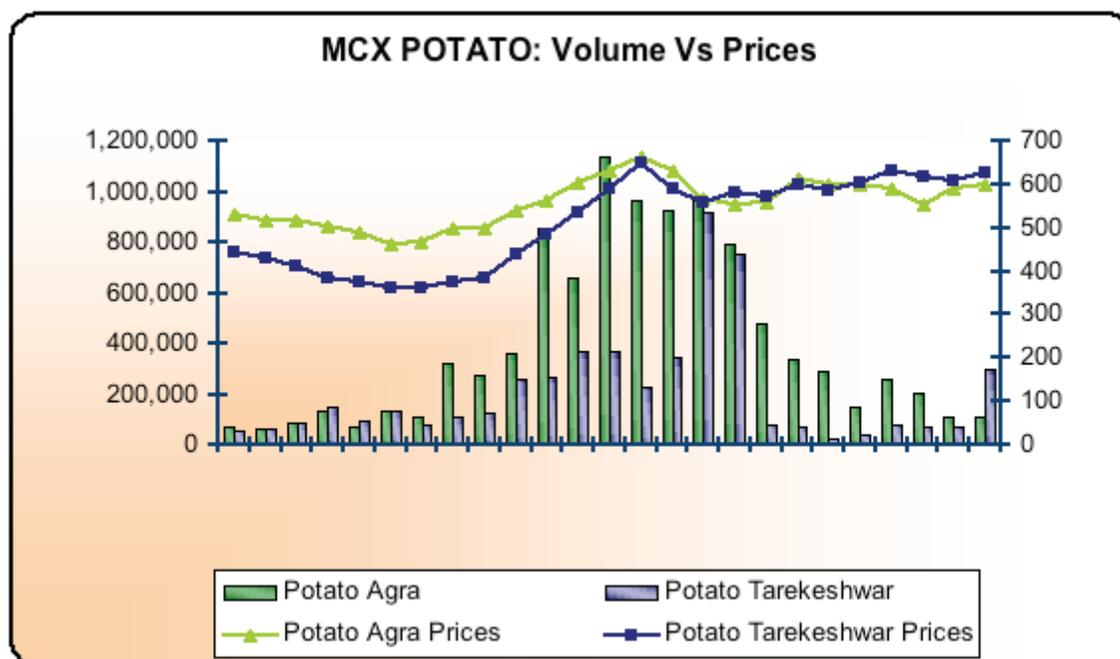
MCX Potato Futures

When the Multi Commodity Exchange of India (MCX) decided to launch a potato futures contract in December 2005, it took a bold step. Despite potatoes' abiding place in the human diet and the bulk nature of the crop – potato futures have either failed to develop or ceased abruptly at other commodity futures exchanges worldwide. None of China's three major exchanges has listed a potato contract even though the country produces a record 70 million MT crop.⁵ Potato futures stopped trading on the London Commodity Exchange and the three classes of potatoes offered on the Warenterminbörse in Germany have an open interest of about 100 contracts. In the U.S., the Maine potato futures contract on the New York Mercantile Exchange suffered two scandalous defaults before becoming defunct in what became known as the Simplot Potato affair in 1976.⁶

⁵ China's multiple exchanges in the 1990's listed over 60 products (many of which the government has since delisted), but never launched potato futures.

⁶ In both cases, the defaults occurred because the short failed to deliver the amount of potatoes outstanding in the open contracts.

MCX launched two domestic potato futures contracts in March 2006. One features delivery in cold storage warehouses in Agra; the other delivery in Tarkeshwar. The contracts are traded in Rs. per quintal and are based on a quantity of 30 MT – the approximate harvest tonnage from two hectares. During the October/November 2006 season, the volume of trade for both futures contracts was approximately 12,000 MT, which should be considered a vibrant start for a new agricultural contract. Deliveries of potatoes began occurring on the April 2007 contract, one year after inception, when 40 contracts were tendered in Agra for 1200 MT. The May 2007 contract experienced deliveries on both the Agra and Tarkeshwar contracts, totaling 5130MT and 1230MT, respectively.



forecasters predict production to climb to 30 million MT by 2009, fueling even greater need for cold storage facilities.

Also, since the Tarkeshwar contract has delivery locations near coastal areas, this instrument might help in promoting exports. The Indian government recorded only limited exports last year, reflecting a lack of domestic integration with the global potato marketplace, as well as the perishable nature of the commodity. With the quality assurance provided by the delivery mechanism, the Tarkeshwar contract could enable exporters to ship goods from accredited warehouses in compliance with buyers' standards in the near future.

Table I: Daily price volatility in major agricultural commodities traded at MCX before and after the set up of the Exchange

COMMODITY	DAILY PRICE VOLATILITY	
	BEFORE	AFTER
GRAM	0.024	0.012
WHEAT	0.063	0.052
POTATO	0.179	0.05

According to MCX's research and surveys, many farmers are either unaware of futures or paying limited attention to them; only a few are actually using potato futures for hedging. Low farmer hedging participation, however, is common in futures markets since producers often lack hedgeable quantities, sufficient capital to withstand margin calls, or requisite patience for account paperwork. Moreover, if farmers misjudge final production numbers due to unanticipated weather events, their hedges can quickly turn to losses. The farmers that are aware of futures markets strongly favor physical delivery, and declare that commodity futures exchange prices are better than physical market prices.⁷ Research suggests that aggregators such as cooperatives can better provide farmers with hedging and risk mitigation capabilities by pooling purchases and passing on pricing efficiencies to farmers. The IIM LR reports some interest in aggregation in the Agra area. Because the MCX potato contract experiences respectable volume (and recently deliveries), it is on track to be the first successful venture in this sizable foodstuff sector.

⁷ "Farmers, Traders and Cold Storage Owners' Participation in Futures Markets," MCX internal memo.

II. Mentha Oil

Mentha arvensis, commonly known as menthol mint, is widely used in the food, flavorings, pharmaceutical, and cosmetic industries. Permeating daily life, products containing mentha include confectioneries, perfumes, mouth fresheners, cough drops, tobacco goods, medicated oils, tooth pastes, analgesic balms, lotions, shampoos, chewing gums, candies, and alcoholic beverages. Between 1965 and 2006, the Indian mentha oil market grew from 2 MT to 32,000MT, registering an incredible production increase. Besides being the leading producer, India is the largest consumer of mentha oil, using an estimated 7500 MT in 2006-07, compared to the rest of the world's consumption of about 20,000 MT.⁸ Fifteen years ago India raced ahead of Brazil and China in mentha oil exports and, in a remarkable success story, India now dominates 80 % of the world market.

Marketing channels

The mentha crop is mainly cultivated in the state of Uttar Pradesh and in four districts, Moradabad, Rampur, Bareilly, and Barabanki. Although water-intensive, needing up to 20 irrigations during the crop cycle, it is a profitable rotational cash crop. Sown in February and harvested in May, its leaves are sun-dried and steam distilled to release the oil. Most mentha leaf producers have distilling equipment on their farms.

Composition of Cost and Returns of mentha oil production

Items		Value
A	Cost of cultivation (Rs/hectare)	22500
B	Harvesting/loading cost (Rs/hectare)	3750
C	Cost of extraction of oil (Rs/hectare)	5250
D	Total cost (A+B+C) (Rs/hectare)	31500
E	Yield of oil (Kg/hectare)	113
F	Price of oil (Rs/Kg)	450
G	Total Returns (E*F) (Rs/hectare)	50850
H	Net Returns over total cost (G-D) (Rs/hectare)	19350

Source: IIM LR

The Ecosystem study describes the producer marketing pattern as follows:

⁸ Estimates provided by MCX

Farmer sells the distilled mentha oil to the commission agent or local brokers. Both of them charge 1% of oil from the farmer. Sometimes broker purchases the oil from the commission agent at an additional margin of 1%. Then there are traders, manufacturers and investors who purchase oil from brokers at a margin of 2.5% respectively. Manufacturers also purchase the oil from Investors and traders for manufacturing Menthol crystals. They further export it, or purchase Menthol crystal from manufacturers, at a margin of 4%. There is about an addition of *Rs 125/Kg* as margin from farmer to the end-consumer.

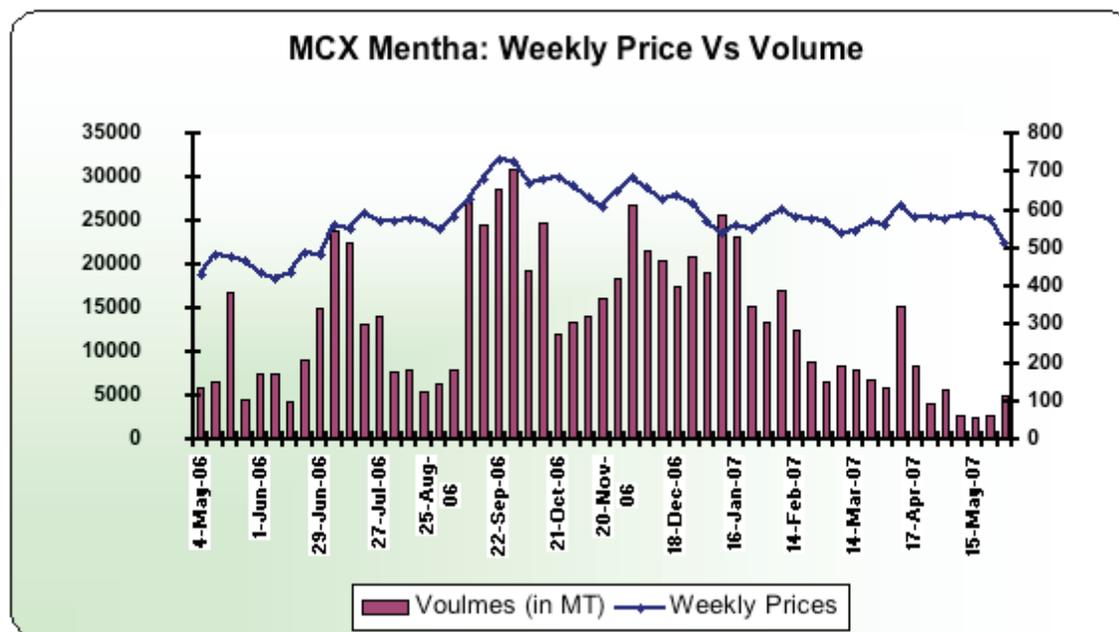
The mentha market shares many similarities with the potato market: according to the IIM LR, mentha oil has no government intervention and is characterized by fragmentation, exploitation, credit constraints, and high volatility with strong broker and middlemen pricing power. In addition, the Gol does not issue supply and demand forecasts for menthe, further impeding price discovery. Unlike potatoes, however, mentha oil can be easily stored in metal barrels after distillation, giving farmers greater holding power.

MCX Mentha Oil Futures

As a unique futures product, the MCX mentha oil futures contract has been highly successful. Between August 2005 and February 2007, mentha oil futures had an average daily open interest and traded volume of 2350 & 2319.38 MT respectively, with a record daily turnover of *Rs 142.83 crore* (\$ 34 million) during the same period.⁹ In the third week of September, 2006, the contract experienced record volume of about 30,000 MT. Mentha oil is priced in rupees per kilogram, traded in serial months in units of 360 kg and is physically delivered in warehouses based in Chandhausi. The MCX futures contract has experienced deliveries for every month since December 2005 when 1037 barrels were tendered.

According to the IIM LR, mentha oil prices have seen significant appreciation since contract launch. The average price during peak arrival season between May and November 2004 was *Rs. 365.61* and for peak demand season between December and mid-February was *Rs. 378.83*. Corresponding prices during 2005-2006 have been *Rs. 442.83* and *663.77* respectively, indicating futures prices are helping to strengthen spot producers prices. An MCX survey reveals that 90% of mentha farmers believe that mentha oil futures have contributed to better prices. In addition, MCX reports volatility levels have declined because futures have reduced the amount of distressed selling. The price and volume chart confirms the continuation of this trend.

⁹ MCX statistics.



Research indicates that mentha oil markets have become more transparent and organized since the inception of futures. An analysis of MCX spot and futures price has revealed about 96% correlation between the two prices indicating that the physical markets are strongly integrated with the futures markets. Record keeping has significantly improved. Previously, price records were non-existent; now, prices are collected twice daily from major mentha oil markets for publication.

Other improvements in the marketplace include higher quality oil, more standardized testing, greater use of storage,¹⁰ better planting decisions, and a more balanced playing field between producers and middlemen. About 300 price dissemination terminals have been added to the mentha producing region since the commencement of futures. As farmers now find end-user prices trickling down to them, they are expanding cultivation and, in many cases, intercropping mentha between wheat and potato seasons. Its immense profitability is prompting farmers to rename the distilled oil "liquid gold."

Mentha oil promises to shine as a legendary product for years to come. As a demand driven market, mentha oil is transforming Indian farming and spotlighting a previously obscure specialty product. Futures markets on mentha oil have undeniably facilitated income benefits for the farmer and distiller of this product.

III. Cardamom

¹⁰ MCX storage rates for mentha oil is Rs. 2.1kg/month.

Regarded as the queen of spices, cardamom has a long and exotic history. The medical compendium Charaka Samhita written between the 2nd century BC and 2nd century AD mentions its therapeutic effects. The 4th century BC Sanskrit treatise on politics, *Kautilya's Arthashastra*, describes its ceremonial use. In 11th century India, cardamom was included in the list of ingredients for panchasugandha-thambula or 'five-fragrance betel chew' in the *Manasollasa* or Book of Splendor. In Kerala, where cardamom grew wild, the Portuguese colonialists and then the British developed cardamom plantation farming and made Kannur the international trade center for cardamom. One of the highest priced spices, cardamom is a culinary ingredient in a wide variety of foodstuffs such as rice, breads, meats and desserts and is also a digestive aid.

Marketing Channels

Today, India is the second largest producer of cardamom after Guatemala, harvesting 12540 MT in 2005-2006. The export market is small and uneven, with 875 MT reported for 2005-2006, compared to 648 MT the previous year. Exports reached a high in 2000-2001 at 1545 MT due to reduced supplies elsewhere. Arab countries are the largest importers of the spice, using it as an additive to "Gahwa," a potent coffee beverage. Japan is the second largest importer, preferring the Indian variety over others for its aromatic qualities in its curry powder blends.

Kerala is the largest grower, generating 70% of India's production. The plants flourish under tropical forest canopy regions, such as the Western Ghat highlands, where cool evening temperatures and heavy annual rainfall foster productivity. Cardamom plants produce 6-9 foot fan-like branches covering the forest floor. The ribbed pods containing the 4 to 6 tiny dark cardamom seeds grow from the stems at the base of each plant. Many cardamom farms are relatively large scale,¹¹ a result of previous plantation farming. The Gol does not support cardamom prices.

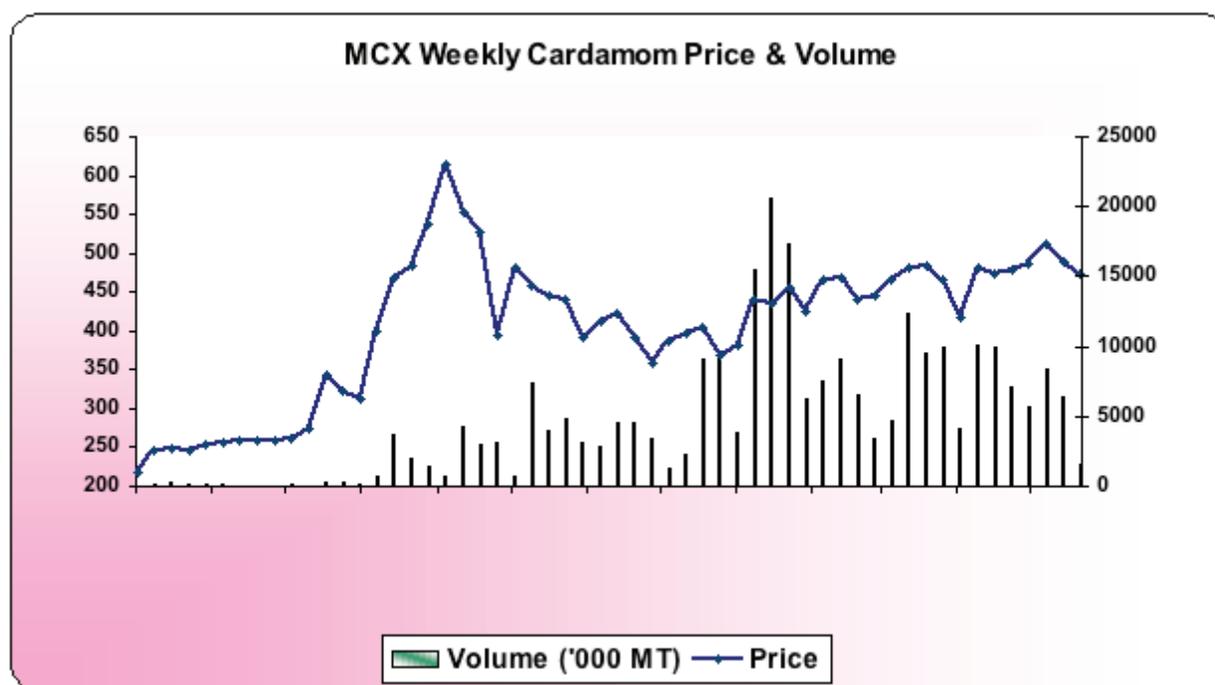
Harvesting season runs from August till January, occasionally carrying into March. The green pods are cleaned and dried in conventional hot air chambers, or increasingly dried in modern machines at centers in the cardamom growing area. Producers sell their dried pods in bulk to local traders or alternatively process the pods into seeds for grading in order to capture quality rewards. The products normally proceed to one of the seven auction centers, such as the Kerala Cardamom Processing and Marketing Co. Ltd. (KCPMC), the largest auction center. The auctions, generally held bi-weekly, conform to standard buyers' market practices with producers receiving the best quoted price for their sample lot, without negotiation.

¹¹ An MCX survey of farmers recorded 4 farms out of 17 ranging from 30 – 100 acres.

Traders and exporters buy the cardamom from the auction centers, having any bulk pod product processed into seeds and graded before further shipment.

MCX Cardamom Futures

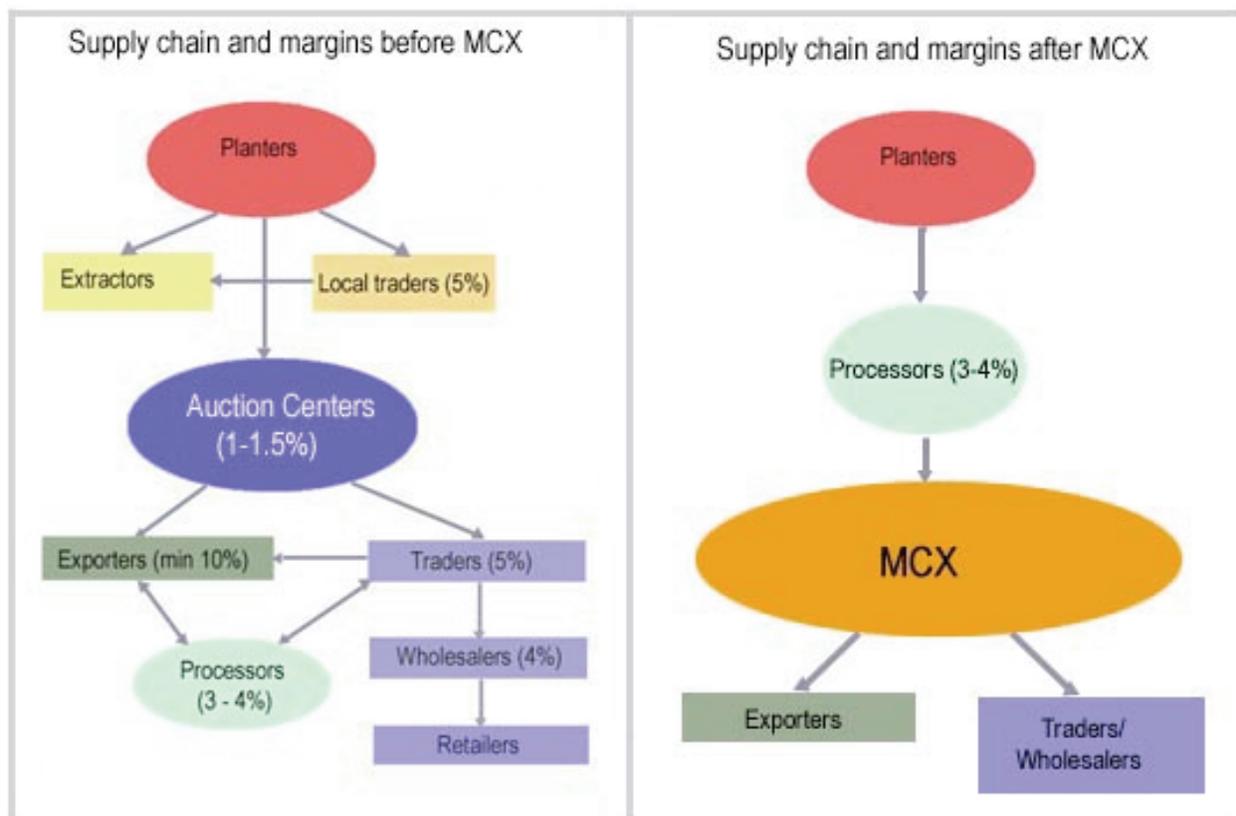
MCX cardamom futures began trading in February, 2006, and have enjoyed an active trade since. Reaching the highest volume of 20,548 MT during the third week of January, 2007, futures achieved an average daily volume during the August to January harvest season of 884 MT. There were a record number of deliveries on the December 2006 contract, totaling 21.5 MT. The contract calls for 7 mm and above grade,¹² compulsory delivery, and features a single delivery center Vandanmehdu. Cardamom is traded in 100 Kgs (one quintal) lots and is priced in Rs. per kilogram.



Cardamom farmers have been more willing than potato or mentha farmers to use futures, owing probably to their large farm size and hedgeable productions. An MCX survey reveals that 9 out of 30 producers interviewed have participated in the futures delivery process. Also, cardamom enjoys strong support from long hedgers, primarily exporters, due in part to the proximity of Vandanmehdu to the sea coast and the contract's single point delivery mechanism. A single delivery location gives long takers a clear advantage in logistical planning. In fact, early indications point to MCX cardamom grades becoming a brand, preferred by Indian exporters and international importers.

¹² 7mm refers to the size of the sieve hole used to segregate the seeds.

As with potato and mentha oil trading, cardamom futures have conferred multiple benefits to cardamom growers and other supply chain participants. Improvements include spot price stabilization, higher prices, quality assurance, and lower payments to intermediaries. Also price transparency has markedly improved thanks to the regional introduction of 60 terminals, up from two prior to futures launch. The construction of 308 MT modern warehouses has greatly increased the industry's ability to house cardamom as these facilities are designed specifically for cardamom storage: they are equipped with scientific temperature and moisture controls and continuous video monitoring systems. Finally, new processing centers have been built in response to MCX delivery grade standards. Although warehouse receipt financing is gaining awareness, few producers are using this system. The following graphs clearly illustrate how the supply chain has been streamlined for cardamom.



Source: MCX

Conclusion

India is witnessing a fundamental change in its agricultural markets because of the introduction of futures markets. Despite their diverse natures, the three commodities reviewed in this paper demonstrate that producers are realizing substantial improvements in marketing alternatives, price stability, and income levels in all three products.¹³ In addition, futures are boosting infrastructure investment. The creation of modern warehouses with ample storage and reliable grading has reduced distressed selling and improved the quality and consistency of the commodities. MCX is also helping producers through a variety of futures markets initiatives. It has formed subsidiaries, such as the National Bulk Handling Corporation, to aid farmers with collateral management and financing. It also hosts producer and cooperative seminars to educate agriculturalists about hedging. One of MCX's leading concepts is the agricultural ecosystem, which envisions organic growth, open markets, and supply chain integration as an effective path for attaining quality production and higher rural incomes.

In his landmark book, *The Road to Serfdom*, the economist Friedrich Hayek argued that *freedom* meant *economic freedom*. He said that “anybody should be free to produce, buy, and sell anything that may be produced or sold at all.” While the GOI has recently lamented the deterioration of the productivity of wheat, a commodity tied to government price intervention, the three commodities reviewed in this paper shine forth as flourishing free-market examples. Hopefully, this report will encourage scholars, business venturers, and government officials to see that producers motivated by price improvement are entrepreneurial, flexible, and resourceful. With more information from futures prices, and new risk management possibilities that futures provide, such farmers will help drive the Second Green Revolution and secure India's position as the premier agricultural nation of the world.

¹³ Similar positive findings on the merits of the NCDEX wheat futures contract were detailed in two previous FMI reports, also sponsored by USAID: “Wheat Futures Performance in India”, April 2007; and “The HAFED Experience – Wheat Hedging on the NCDEX”, May 9, 2007. Go to: www.fmi-inc.net