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Precision Farming In Cotton - Global / Indian Scenario

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GUEST COLUMN

Dr. Brijender Mohan Vithal
Cotton Expert

factors, and foster innovation by dramatically reducing transaction costs. Digital technologies overcome information problems that hinder market access for many small-scale farmers, increase knowledge through new ways of providing extension services, and they provide novel ways for improving agricultural supply chain management. While there are many promising examples of positive impacts on rural livelihoods—or “digital dividends”—these have often not scaled up in India to the extent expected. The main reason is that technology can always only address some, but not all of the barriers faced by farmers in developing countries like India. Information about Precision farming under Indian conditions has been provided below for our readers.

A. Technologies Being Used in Precision Farming

- **Root Zone Optimisation:** Root Zone Temperature Optimisation (RZTO) technology is based on the premise that if the temperature difference above and below the soil surface is too high, the plants are unable to efficiently transport nutrients from their roots to the canopy thereby restricting the

Mobile phones and the internet have significantly affected practically all sectors of the economy and agriculture is no exception. This article introduces a concise framework for describing the main benefits from new information and communication technologies especially to Indian cotton agriculture. They promote greater inclusion in the broader economy, raise efficiency by complementing other production

plant from achieving their genetic potential. The technology improves the physiological activity of the roots by selectively heating and/or cooling the root zone and helps plants receive optimised temperature, water, and desired nutrients leading to highest yield possible under a given set of conditions.

- **Variable Rate Application:** This is one of the precision agriculture technologies that focus on the use of variable rate of seedlings, irrigation, fertilization and pesticides in a field, depending upon the information gathered by a variety of sensors to boost yields and cut costs.
- **Field Scripts:** This crop analysis database, couples billions of files of data on seed types and crop yields with historical weather patterns and identifies the best hybrids and provides a variable rate of planting prescription of the seeds of such hybrids for each field. The process is led by Field Scripts Certified Dealers, who deliver through the Field View Plus app on the farmer's I Pad and execute with precision equipment on the planter for optimised yield for every patch of land in the field.
- **Adoption of Precision Farming:** Companies like CropX are using sensors to detect moisture in the soil and help farmers create irrigation systems for crops based on soil moisture in the soil and help farmers create irrigation systems for crops based on soil moisture and temperature. This type of technology can help farmers become more sustainable by customizing water applications to the soil.

B. A Few Highlights:-

- During 2017 about 73.5% of cotton farmers adapted Precision Farming Technology in southern U.S.
- In the northern region of Ghana, an initiative delivers tailored climate information services to farmers, which assists their decision making vis-à-vis climate variability. Up to about 1000 farmers (33% of which are women) are now accessing and applying seasonal forecast information in their farm management operations and other livelihood activities.

➤ **Eye in the Sky:** In West Africa, the Imagery for Smallholders - Activating Business Enterprises and Leveraging Agriculture (ISABELA) initiative promotes the use of imagery by smallholder farmers and intermediaries to make agriculture a profitable undertaking. The project aims to tackle two problems:

- a. Lack of transparent land tenure information services, which deters investment by smallholders and puts them at a disadvantage vis-à-vis urban and international investors and
- b. Inability to cost-effectively predict and value seasonal agricultural production. These problems have been addressed using a combination of four technologies: satellite imagery, UAV (unmanned aerial vehicle) imagery, ground-based digital sensors, and web-2-mobile platforms.

➤ The farmers need incentives and education to understand the benefits and adopt the disruptive technologies in agriculture sector. This could be in terms of initial cost of technology procurement through financial assistance linked to profit and/or subsidies from national governments.

➤ Adoption challenges aside, scientists in public and private sector have been developing and introducing such technologies, which coupled with digital technologies have potential to change the way agriculture is practiced.

Increased land tenure security leads to higher investment in improved land management practices, eventually leading to higher and more sustainable agricultural productivity. To be able to predict agricultural production, digital libraries and algorithms were developed for smallholder crop recognition and crop-specific management support at scale. This enables agro-dealers to provide targeted services such as finance, fertilizer, seed, pest control, agronomic operations and harvest management leading to agricultural intensification.

We hereby discuss adoption of selected disruptive technologies and that how they change the Indian Cotton Industry to take it to new heights:- .

C. Digital Technologies to Transform Indian Agriculture- Cotton:

- A successful future growth strategy for agriculture will need to perceive agriculture as a business enterprise involving constant innovation and catering to dynamic market demand.
- Although agricultural technologies are fast evolving in India and a mix of business models are driving the ecosystem, there is a need to design the pathway to successful commercialisation and to scale it up by utilising the right incentives and policy support. Technology will continue to play an important role while the dynamics of the agriculture sector changes and produces new challenges.
- With the private sector playing an increasingly important role in investments, operations, and expertise, agriculture will gain immensely as the public sector catalyses these efforts. The IT revolution in India was brought forward by the private sector, with the public sector creating an enabling environment.
- Uptake of technologies at market prices in a sector that has traditionally been heavily subsidised remains challenging, but many farmers are prompt to identify what works in their interest and are ready to pay for it.
- Digital technologies offer the potential to achieve the necessary conditions for scale, with distributed low cost and customised delivery, creating a unique opportunity for private enterprise and innovation to thrive.

The challenge before India lies in balancing high growth with inclusive growth; leveraging technology to achieve these twin goals will be a fascinating journey to track.

D. Applications of Digital Technologies in Precision Farming

1. Drones

a. Crop Monitoring By Drones

- Precision Agriculture also called smart farming is based on the use of advanced technology in the management of crops to increase output without compromising quality. The need to maintain the balance

between cost and quality has made drones particularly attractive for smart farming. Drones are affordable and don't require a whole lot of training to pilot; but the pilot does need certification. Commercial drones are tough enough to carry remote sensing technology that previously required satellite connectivity or the use of manned aircraft.

- Multi-spectral sensors allow a farmer to precisely apply needed water, fertilizers, or pesticides only where they are needed instead of applying the same amounts across the entire field. These sensors acquire imagery in bands that can sense vegetation health and identify areas in the fields that are nitrogen deficient through a process known as Normalised Difference Vegetation Index.
- Farmers need to evaluate crop health and spot bacterial or fungal infections. By scanning a crop using both visible and near infrared light, drone carried devices can identify which plants reflect different amounts of green light and NIR light. This information can generate multi-spectral images that trace changes in plants and reveal their health. A quick response can save an entire planting, by applying solutions as needed.
- Crop Spraying with an unmanned aerial vehicle (drone) sprayer does not need a runway; the drone can take off and land vertically. Flying at the low altitude of several yards, the crop-spraying can be controlled. Drones are suitable for all kinds of complex terrain, crops and plantings of varying heights. Precise and accurate crop spraying ensures the best coverage and application of fertilizers or pesticides.
- Aerial application—crop dusting—involves spraying crops with crop protection products from an agricultural aircraft. Until drones came along, a farmer needed a specialized agricultural aircraft to perform this operation, which was expensive and not very precise. Now, a farmer can cut costs with their own UAV Sprayer.

(To be continued...)

(The views expressed in this column are of the author and not that of Cotton Association of India)



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The Cotton Association of India (CAI) is respected as the chief trade body in the hierarchy of the Indian cotton economy. Since its origin in 1921, CAI's contribution has been unparalleled in the development of cotton across India.

The CAI is setting benchmarks across a wide spectrum of services targeting the entire cotton value chain. These range from research and development at the grass root level to education, providing an arbitration mechanism, maintaining Indian cotton grade standards, issuing Certificates of Origin to collecting and disseminating statistics and information. Moreover, CAI is an autonomous organization portraying professionalism and reliability in cotton testing.

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COTTON ASSOCIATION OF INDIA

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CAI maintains its Cotton Crop Estimate for 2019-20 Crop Year at 354.50 Lakh Bales

Cotton Association of India (CAI) has released its January estimate of the cotton crop for the season 2019-20 beginning from 1st October 2019. The CAI has retained its cotton crop estimate for 2019-20 at 354.50 lakh bales of 170 kgs. each i.e. at the same level as in the previous estimate. A statement containing the State-wise estimate of the cotton crop and the balance sheet as on 30th September 2020 drawn by the Crop Committee of the CAI with the corresponding data for 2018-19 crop year is given below.

The total cotton supply estimated by the CAI during the months of October 2019 to January 2020 is 234.89 lakh bales of 170 kgs. each which consists of the arrivals of 192.89 lakh bales upto 31st January 2020 (equivalent to 205 lakh running bales of 160 kgs. each), imports of 10.00 lakh bales upto 31st January 2020 and the opening stock at the beginning of the season which has been revised by the CAI from 23.50 lakh bales to 32 lakh bales based on the feedback received from the Trade sources and as per the discussions held at the meeting of CAI Crop Committee.

Further, the CAI has estimated cotton consumption during the months of October 2019 to January 2020 at 106 lakh bales of 170 kgs. each (which is equivalent to 113 lakh running bales of 160 kgs. each) while the export shipment of cotton estimated by the CAI upto 31st January 2020 is 20 lakh bales of 170 kgs. each. Stock at the end of January 2020 is estimated by the CAI at 108.89 lakh bales (equivalent to 115.70 lakh running bales of 160 kgs. each) including 38 lakh bales (equivalent to 40 lakh running bales of 160 kgs. each) with textile mills and remaining 70.89 lakh bales with CCI and others (MNCs, Traders, Ginners, etc.). Kapas has not been considered in the stock figures.

The yearly Balance Sheet projected by the CAI estimated total cotton supply till end of the cotton season i.e. upto 30th September 2020 at 411.50 lakh bales of 170 kgs. each. Total cotton supply consists of the Opening Stock at the beginning of the Season which the Committee has revised from 23.50 lakh bales to 32 lakh bales as per the feedback received from Trade sources and the discussions held in the meeting, crop for the season estimated at 354.50 lakh bales and imports estimated by the CAI at 25.00 lakh bales, which are lower by 7.00 lakh bales compared to the previous year's estimate at 32.00 lakh bales.

Domestic consumption estimated by the CAI for the entire crop year i.e. upto 30th September 2020 is

331 lakh bales i.e. at the same level as estimated by the Cotton Advisory Board at their meeting held on 28th November 2019. The CAI has estimated exports for the season at 42 lakh bales i.e. at the same level as estimated in the previous year. The carryover stock estimated at the end of the season is 38.50 lakh bales i.e. higher by 8.50 lakh bales compared to that estimated earlier.

Highlights of Deliberations held at the meeting of the Crop Committee of Cotton Association of India on 3rd February 2020

Crop Committee of Cotton Association of India (CAI) met on 3rd February 2020. 10 members were present. Based on the data available from various trade sources, upcountry associations and other stakeholders, the Committee has arrived at its January estimate of the cotton crop for the 2019-20 season beginning on 1st October 2019 and drew estimated cotton balance sheet.

The following are the highlights of deliberations held at the said meeting: -

1. The cotton crop estimate for the season 2019-20 is retained by the CAI at 354.50 lakh bales i.e. at the same level as estimated by it in the previous month and there are no changes in the state-wise crop figures estimated now compared to the previous month.
2. There is no change in the projection of cotton export for the season and the same is retained at 42 lakh bales as estimated by the CAI previously.
3. There is no change in the projection of import of cotton and the same is retained at 25 lakh bales as estimated by the CAI previously. The import figure is lower by 7.00 lakh bales compared to that estimated for the last year.
4. The yearly consumption is estimated by the CAI at 331 lakh bales i.e. same as estimated by the Cotton Advisory Board at its meeting held on 28th November 2019.
5. Indian cotton arrivals during the months of October 2019 to January 2020 are estimated at 192.89 lakh bales.
6. Shipment of imports from 1st October 2019 to 31st January 2020 which have reached Indian Ports are estimated at 10.00 lakh bales while balance 15 lakh bales are estimated to arrive Indian Ports during the period from 1st February 2020 to 30th

September 2020 (total imports estimated during the entire season are 25 lakh bales).

7. Cotton export shipments from 1st October 2019 to 31st January 2020 which have already been shipped are estimated at 20 lakh bales while balance 22 lakh bales are expected to be shipped during the period from 1st February 2020 to 30th September 2020 (total exports estimated during the entire season are 42 lakh bales).
8. Consumption by Indian spinning mills for 4 months i.e. from 1st October 2019 to 31st January 2020 is estimated at 106 lakh bales.
9. Cotton stock held by mills in their godowns on 31st January 2020 is estimated at 38 lakh bales of 170 kgs. each which is equivalent to 40.38 lakh running bales of 160 kgs. each.
10. CCI, MNCs, Ginners and MCX are estimated to have stock of about 70.89 lakh bales as on 31st January 2020 which is equal to about 75.32 lakh running bales of 160 kgs. each (Mills are having stock of 45 days consumption).
11. Thus, total stock held by spinning mills and stockists on 31st January 2020 is estimated at 108.89 lakh bales of 170 kgs. each which is equal to about 115.70 lakh running bales of 160 kgs. each. (Raw cotton stock in CCI and Ginning Factories are not considered in this 115.70 lakh bales stock).
12. Closing stock as on 30th September 2020 is estimated by the Committee at 38.50 lakh bales of 170 kgs. each.

**CAI's Estimates of Cotton Crop
as on 31st January 2020
for the Seasons 2019-20 and 2018-19**

(in lakh bales of 170 kg.)

State	Production *		Arrivals as on 31st January 2020 (2019-20)
	2019-20	2018-19	
Punjab	10.00	8.50	6.09
Haryana	26.00	23.00	15.35
Upper Rajasthan	12.50	13.35	8.50
Lower Rajasthan	12.50	14.65	10.20
Total North Zone	61.00	59.50	40.14
Gujarat	96.00	88.00	44.70
Maharashtra	85.00	70.00	37.60
Madhya Pradesh	16.00	22.63	9.70
Total Central Zone	197.00	180.63	92.00

Telangana	51.00	35.20	37.00
Andhra Pradesh	15.00	11.85	8.70
Karnataka	20.50	15.50	11.50
Tamil Nadu	5.00	5.00	1.00
Total South Zone	91.50	67.55	58.20
Orissa	4.00	3.32	2.20
Others	1.00	1.00	0.35
Total	354.50	312.00	192.89

* Including loose

The Balance Sheet drawn by the Association for 2019-20 and 2018-19 is reproduced below:-

(in lakh bales of 170 kg.)

Details	2019-20	2018-19
Opening Stock	32.00	33.00
Production	354.50	312.00
Imports	25.00	32.00
Total Supply	411.50	377.00
Mill Consumption	288.00	274.50
Consumption by SSI Units	25.00	25.00
Non-Mill Use	18.00	12.00
Total Domestic Demand	331.00	311.50
Available Surplus	80.50	65.50
Exports	42.00	42.00
Closing Stock	38.50	23.50

**Balance Sheet of 4 months i.e. from 1.10.2019 to
31.01.2020 for the season 2019-20**

Details	(in lakh b/s of 170 kg)	(in '000 Tons)
Opening Stock as on 01.10.2019	32.00	544.00
Arrivals upto 31.01.2020	192.89	3279.13
Imports upto 31.01.2020	10.00	170.00
Total Available	234.89	3993.13
Consumption	106.00	1802.00
Export Shipment upto 31.01.2020	20.00	340.00
Stock with Mills	38.00	646.00
Stock with CCI, MNCs & Ginners	70.89	1205.13
Total	234.89	3993.13

UPCOUNTRY SPOT RATES (Rs./Qtl)													
Sr. No.	Growth	Grade Standard	Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [By law 66 (A) (a) (4)]					Spot Rate (Upcountry) 2018-19 Crop February 2020					
			Grade	Staple	Micronaire	Gravimetric Trash	Strength /GPT	3rd	4th	5th	6th	7th	8th
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 – 7.0	4%	15	-	-	-	-	-	-
2	P/H/R (SG)	ICS-201	Fine	Below 22mm	5.0 – 7.0	4.5%	15	-	-	-	-	-	-
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	13%	20	9167 (32600)	9167 (32600)	9167 (32600)	9167 (32600)	9167 (32600)	9167 (32600)
4	KAR	ICS-103	Fine	23mm	4.0 – 5.5	4.5%	21	9758 (34700)	9758 (34700)	9758 (34700)	9758 (34700)	9758 (34700)	9758 (34700)
5	M/M (P)	ICS-104	Fine	24mm	4.0 – 5.5	4%	23	-	-	-	-	-	-
6	P/H/R (U) (SG)	ICS-202	Fine	27mm	3.5 – 4.9	4.5%	26	-	-	-	-	-	-
7	M/M(P)/SA/TL	ICS-105	Fine	26mm	3.0 – 3.4	4%	25	-	-	-	-	-	-
8	P/H/R(U)	ICS-105	Fine	27mm	3.5 – 4.9	4%	26	-	-	-	-	-	-
9	M/M(P)/SA/TL/G	ICS-105	Fine	27mm	3.0 – 3.4	4%	25	-	-	-	-	-	-
10	M/M(P)/SA/TL	ICS-105	Fine	27mm	3.5 – 4.9	3.5%	26	-	-	-	-	-	-
11	P/H/R(U)	ICS-105	Fine	28mm	3.5 – 4.9	4%	27	-	-	-	-	-	-
12	M/M(P)	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	-	-	-	-	-	-
13	SA/TL	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	-	-	-	-	-	-
14	GUJ	ICS-105	Fine	28mm	3.7 – 4.5	3%	27	-	-	-	-	-	-
15	R(L)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	-	-	-	-	-	-
16	M/M(P)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	-	-	-	-	-	-
17	SA/TL/K	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	-	-	-	-	-	-
18	GUJ	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	-	-	-	-	-	-
19	M/M(P)	ICS-105	Fine	30mm	3.7 – 4.5	3.5%	29	-	-	-	-	-	-
20	SA/TL/K/O	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	-	-	-	-	-	-
21	M/M(P)	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	-	-	-	-	-	-
22	SA/TL/K/TN/O	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	-	-	-	-	-	-
23	SA/TL/K/TN/O	ICS-106	Fine	32mm	3.5 – 4.2	3%	31	-	-	-	-	-	-
24	M/M(P)	ICS-107	Fine	34mm	3.0 – 3.8	4%	33	-	-	-	-	-	-
25	K/TN	ICS-107	Fine	34mm	3.0 – 3.8	3.5%	33	-	-	-	-	-	-

(Note: Figures in bracket indicate prices in Rs./Candy)

UPCOUNTRY SPOT RATES								(Rs./Qtl)					
Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [By law 66 (A) (a) (4)]								Spot Rate (Upcountry) 2019-20 Crop February 2020					
Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Gravimetric Trash	Strength /GPT	3rd	4th	5th	6th	7th	8th
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 - 7.0	4%	15	10236 (36400)	10236 (36400)	10236 (36400)	10236 (36400)	10236 (36400)	10208 (36300)
2	P/H/R (SG)	ICS-201	Fine	Below 22mm	5.0 - 7.0	4.5%	15	10376 (36900)	10376 (36900)	10376 (36900)	10376 (36900)	10376 (36900)	10348 (36800)
3	GUJ	ICS-102	Fine	22mm	4.0 - 6.0	13%	20	-	-	-	-	-	-
4	KAR	ICS-103	Fine	23mm	4.0 - 5.5	4.5%	21	-	-	-	-	-	-
5	M/M (P)	ICS-104	Fine	24mm	4.0 - 5.5	4%	23	9673 (34400)	9617 (34200)	9617 (34200)	9645 (34300)	9645 (34300)	9617 (34200)
6	P/H/R (U) (SG)	ICS-202	Fine	27mm	3.5 - 4.9	4.5%	26	10770 (38300)	10714 (38100)	10770 (38300)	10798 (38400)	10798 (38400)	10770 (38300)
7	M/M(P)/SA/TL	ICS-105	Fine	26mm	3.0 - 3.4	4%	25	-	-	-	-	-	-
8	P/H/R(U)	ICS-105	Fine	27mm	3.5 - 4.9	4%	26	10911 (38800)	10854 (38600)	10911 (38800)	10939 (38900)	10939 (38900)	10911 (38800)
9	M/M(P)/SA/TL/G	ICS-105	Fine	27mm	3.0 - 3.4	4%	25	-	-	-	-	-	-
10	M/M(P)/SA/TL	ICS-105	Fine	27mm	3.5 - 4.9	3.5%	26	-	-	-	-	-	-
11	P/H/R(U)	ICS-105	Fine	28mm	3.5 - 4.9	4%	27	10995 (39100)	10939 (38900)	11023 (39200)	11051 (39300)	11051 (39300)	11023 (39200)
12	M/M(P)	ICS-105	Fine	28mm	3.7 - 4.5	3.5%	27	10826 (38500)	10826 (38500)	10882 (38700)	10911 (38800)	10882 (38700)	10854 (38600)
13	SA/TL	ICS-105	Fine	28mm	3.7 - 4.5	3.5%	27	10882 (38700)	10882 (38700)	10939 (38900)	10967 (39000)	10967 (39000)	10939 (38900)
14	GUJ	ICS-105	Fine	28mm	3.7 - 4.5	3%	27	10854 (38600)	10882 (38700)	10939 (38900)	10967 (39000)	10939 (38900)	10911 (38800)
15	R(L)	ICS-105	Fine	29mm	3.7 - 4.5	3.5%	28	10995 (39100)	10995 (39100)	11051 (39300)	11107 (39500)	11107 (39500)	11079 (39400)
16	M/M(P)	ICS-105	Fine	29mm	3.7 - 4.5	3.5%	28	10995 (39100)	11023 (39200)	11079 (39400)	11107 (39500)	11079 (39400)	11051 (39300)
17	SA/TL/K	ICS-105	Fine	29mm	3.7 - 4.5	3%	28	11079 (39400)	11107 (39500)	11135 (39600)	11164 (39700)	11135 (39600)	11107 (39500)
18	GUJ	ICS-105	Fine	29mm	3.7 - 4.5	3%	28	11023 (39200)	11051 (39300)	11107 (39500)	11135 (39600)	11107 (39500)	11079 (39400)
19	M/M(P)	ICS-105	Fine	30mm	3.7 - 4.5	3.5%	29	11135 (39600)	11164 (39700)	11220 (39900)	11248 (40000)	11248 (40000)	11220 (39900)
20	SA/TL/K/O	ICS-105	Fine	30mm	3.7 - 4.5	3%	29	11220 (39900)	11248 (40000)	11304 (40200)	11332 (40300)	11332 (40300)	11304 (40200)
21	M/M(P)	ICS-105	Fine	31mm	3.7 - 4.5	3%	30	11698 (41600)	11698 (41600)	11698 (41600)	11726 (41700)	11726 (41700)	11698 (41600)
22	SA/TL/K / TN/O	ICS-105	Fine	31mm	3.7 - 4.5	3%	30	11754 (41800)	11754 (41800)	11810 (42000)	11838 (42100)	11838 (42100)	11810 (42000)
23	SA/TL/K/ TN/O	ICS-106	Fine	32mm	3.5 - 4.2	3%	31	12176 (43300)	12176 (43300)	12232 (43500)	12260 (43600)	12260 (43600)	12232 (43500)
24	M/M(P)	ICS-107	Fine	34mm	3.0 - 3.8	4%	33	15747 (56000)	15747 (56000)	15888 (56500)	15888 (56500)	15888 (56500)	15860 (56400)
25	K/TN	ICS-107	Fine	34mm	3.0 - 3.8	3.5%	33	16310 (58000)	16310 (58000)	16450 (58500)	16450 (58500)	16450 (58500)	16422 (58400)

(Note: Figures in bracket indicate prices in Rs./Candy)