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From the Chairman's Desk

Dear friends,

It is so heartwarming to announce that The Pulses Conclave 2016 held at Jaipur, India, during February 17-19, 2016 was undoubtedly a huge success. Participation of more than 1100 delegates from 28 countries in the 3-day event was way ahead of delegate participation in the previous two editions of the Conclaves in 2014 (Goa) and 2012 (Mumbai).

Friends, we are all aware of the severe water crisis that Marathwada is facing with three consecutive years of drought. IPGA, as part of its International Year of Pulses initiative has undertaken a massive water resources rejuvenation project across eight villages in Marathwada – three in Phulambri Taluka of Aurangabad District and five villages in Bhokardan Taluka of Jalna District. The project work includes widening and deepening of river beds and nallahs which will help hold rain water to recharge the water resources like wells and bore-wells of these villages.

IPGA is undertaking this exercise for a 1 km distance in each of these villages but the total distance that needs to be covered is far more. I would like to invite each of you to voluntarily come forward and contribute to this project so that we can increase the distances being covered. Mr. Jitu Bheda, Hon. Secretary of IPGA is the Project Director and Pradeep Ghorpade at the IPGA office can give you further details of the project.

Friends, IPGA through its efforts has achieved in getting the Permissible Foreign Matter content in imported Raw Unprocessed Pulses increased to 3% and is continuing its efforts to get imported pulses reclassified as a low risk food item.

We all are aware of the proposed Pulses Price Control Act for Maharashtra State. A delegation from the Association met Shri Girish Bapat, Hon. Minister for Food, Civil Supplies and Consumer Protection and briefed him about the negative effects of this Act. Shri Bapat assured the delegation that the State Administration shall invite all trade stakeholders for their input on the prices before finalising them.

I am quite sure that these discussions shall be fruitful and assure you that the Association will do its level best to safeguard the interests of all trade stakeholders.

Warm regards.

Pravin Dongre
CHAIRMAN

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Public and Private Forecast

Brian Clancey

Public and private forecasters are predicting an above normal monsoon for the Indian subcontinent this year.

In its first forecast of the year, the India Meteorological Department (IMD) said the South West monsoon, which lasts from June 1 to September 30, will probably be 4% to 10% above the long period average (LPA). Chances of below normal or deficit monsoon are rated very low.

A similar forecast was issued by private forecaster Skymet Weather, which thinks rainfall accumulations will 5% above normal, with a 35% probability of above average rainfall. Earlier in the month, private climate management company Weather Risk Management Services also predicted that monsoon 2016 would be about 5% to 10% above normal.

If realized, this has the potential to see combined kharif and rabi season pulse production across the 2016-17 production campaign rebound from 17.33 to at least 19 million metric tons (MT).

An above average monsoon does not necessarily translate into a bigger kharif or monsoon season harvest. That depends on the timing and progress of rains. If the monsoon starts slow because of the lingering effects of El Nino, it could result in a slow start to pulse seeding in India. This could see kharif season pulse production remain relatively low.

A strong finish to the monsoon season would be too late to have a significant impact on the amount of land sown to pulses during the kharif season. But, it would contribute to increased interest in seeding pulses during the rabi season because soil moisture and irrigation reserves would be recharged.

This is significant because during the past five years, India produced 67% of its pulses during the rabi season. During that period, production ranged from 65% to 69% of the total. It is worth noting that rabi season output has become increasingly important in India and has been the main source of the production increases seen since 2010. In the five seasons spanning 2001 through 2005, the rabi crop accounted for an average 63% of the India's total pulse output.

Harvesting 19 million MT or more pulses will have a significant impact on imports in 2017. This reflects the fact that the improvement in domestic output will not be felt on local markets until the bulk of next year's rabi crop has been harvested.

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This will be especially true if rainfall patterns do not allow significant expansion kharif output.

As it stands, imports are expected to remain strong through the end of the calendar year. By the third week of November, markets will have a good sense for how much rabi season pulse seedings will likely increase. On average 55% of the crop is in the ground by that time, with seeding 90% complete by the end of December.

When it comes to kharif season pulses, July is the most critical month. Farmers typically plant 65% of the pulse crop that month. If the monsoon starts slow and conditions are drier than normal in pulse producing areas, it could prevent much expansion from taking place. On the other hand, a strong finish to the monsoon season would be expected to benefit average yields for crops that had been planted, contributing to a forecast improvement in kharif season pulse output from 5.37 million to at least 5.94 million MT.

The most important kharif season pulse is tur or pigeon pea. When production is down, India tends to increase imports of green lentils, which some millers substitute for pigeon pea. Similarly, if green lentils are available at large enough discounts to tur or pigeon pea, demand would likely improve. With most of the increase in world lentil output expected to be in red, green lentil markets may need to rely more on problems with the pigeon pea crop than price to maintain import demand.

Shipments so far during Canada's 2015-16 marketing campaign clearly reflect the impact of two small pigeon pea harvests in India. This has markets nervous about a potential rebound in output in India. Farmers there hope the monsoon progresses in a way which gives them a chance to take advantage of unusually strong domestic values for tur.

Red lentil, yellow pea and desi chickpea demand is affected more by the rabi than kharif harvest. This means the impact of a prospective improvement in pulse production during the 2016-17 production campaign will be felt more after the Christmas, when exporters start working to clear inventories before the 2017-18 season gets underway. With world production expected to increase significantly for those crops, what happens to this summer's monsoon and its lingering impact on pulse production on the Indian subcontinent is critical to the evolution of prices after the November-December shipping period.

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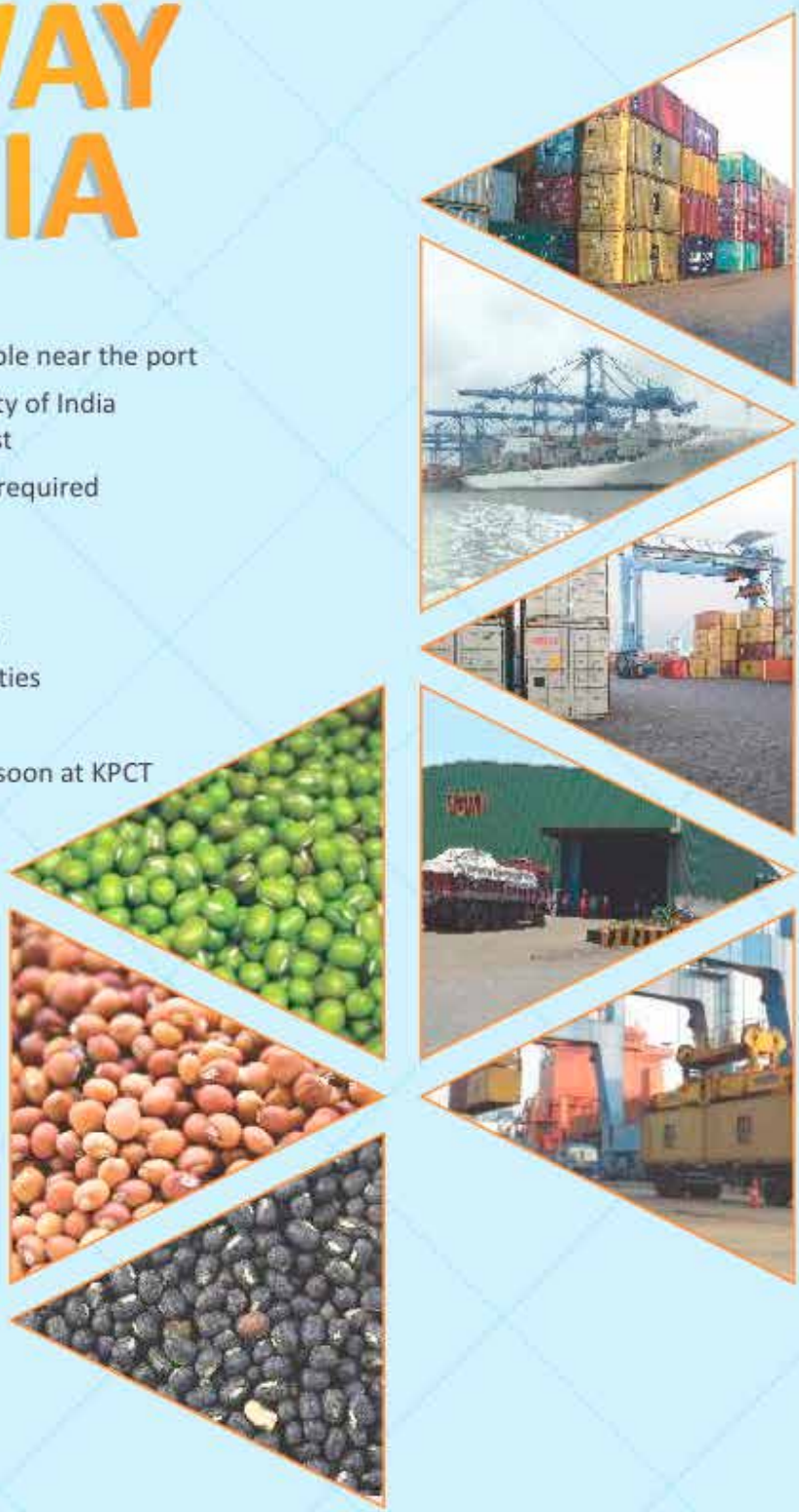

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Production	2013	2014	2015	2016	Average	vs average
Beans	22,132,000	23,174,000	23,239,000	22,866,000	22,819,400	0.2%
Chickpeas	13,044,000	13,557,000	11,501,500	12,518,800	12,333,700	1.5%
Lentils	5,082,000	4,617,000	4,943,000	6,397,000	4,708,400	35.9%
Peas	10,519,000	10,958,000	10,436,000	12,689,000	10,469,800	21.2%
Total	50,777,000	52,306,000	50,119,500	54,470,800	50,331,300	8.2%

Total Supply	2013	2014	2015	2016	Average	vs average
Beans	23,200,000	24,109,000	24,070,000	23,671,000	23,703,400	-0.1%
Chickpeas	13,382,000	13,970,000	11,733,500	12,594,800	12,626,500	-0.3%
Lentils	5,703,000	5,535,000	5,392,000	6,584,000	5,563,600	18.3%
Peas	10,819,000	11,448,000	11,336,000	13,279,000	11,047,800	20.2%
Total	53,104,000	55,062,000	52,531,500	56,128,800	52,941,300	6.0%

Trade	2013	2014	2015	2016	Average	vs average
Beans	3,849,000	4,012,000	4,201,000	3,903,000	4,127,800	-5.4%
Chickpeas	1,149,000	1,263,000	1,517,000	1,579,000	1,422,747	11.0%
Lentils	2,583,000	2,960,000	3,153,000	3,661,000	2,639,400	38.7%
Peas	4,430,000	5,110,000	4,460,000	5,450,000	4,206,000	29.6%
Total	12,011,000	13,345,000	13,331,000	14,593,000	12,395,947	17.7%

Inferred Use	2013	2014	2015	2016	Average	vs average
Beans	22,265,000	23,278,000	23,265,000	22,883,000	22,858,600	0.1%
Chickpeas	12,969,000	13,738,000	11,657,500	12,428,800	12,359,300	0.6%
Lentils	4,785,000	5,086,000	5,205,000	5,981,000	4,906,000	21.9%
Peas	10,329,000	10,548,000	10,746,000	12,319,000	10,517,800	17.1%
Total	50,348,000	52,650,000	50,873,500	53,611,800	50,641,700	5.9%

Ending Stocks	2013	2014	2015	2016	Average	vs average
Beans	935,000	831,000	805,000	788,000	844,800	-6.7%
Chickpeas	413,000	232,000	76,000	166,000	267,200	-37.9%
Lentils	918,000	449,000	187,000	603,000	657,600	-8.3%
Peas	490,000	900,000	590,000	960,000	530,000	81.1%
Total	2,756,000	2,412,000	1,658,000	2,517,000	2,299,600	9.5%

Stocks to Use	2013	2014	2015	2016	Average	vs average
Beans	4%	3%	3%	3%	4%	-0%
Chickpeas	3%	2%	1%	1%	2%	-1%
Lentils	16%	8%	3%	9%	12%	-3%
Peas	5%	8%	5%	7%	5%	2%
Total	5%	4%	3%	4%	4%	0%

BASED on historical data from the FAO and other country specific data sources

All Eyes on Canada in 2016

Anya McNabb, Pulse Canada

With global stock of pulses at record lows, all eyes will be on the world's largest exporter of peas and lentils in the coming growing season. Some areas of Canada, like southern Alberta, started planting in April. Most other regions will be seeding into late May.

"There are very strong market signals for farmers to increase pulse acres, and Canadian farmers are responding accordingly," said Jonathon Dreidger, Senior Market Analyst at FarmLink Marketing Solutions in Winnipeg, Manitoba. "This includes lentils being planted in regions that have never grown them before, and some acres of soybeans in Manitoba getting bumped out for peas."

Estimates from Statistics Canada, released April 21, 2016, predicted that the seeded area of both peas and lentils will break records this year. Canadian farmers are expected to seed a little over 5.14 million acres of lentils, a 30% increase over 2015. Dry peas are expected to be planted on 4.28 million acres, a 16% increase over last year. Both increases are expected as a result of strong export demand.

"Farmers are responding to very strong prices, driven by a global shortage of pulses," said Chuck Penner, Market Analyst at LeftField Commodity Research. "The increase in seeded area is a result of farmers reacting to a profitable opportunity."

Record-Breaking Production Expected

"The large increase is no surprise," said Driedger. "But as important as acres are, yield will have a greater impact on the final production figure than any incremental adjustments to area in future reports."

Statistics Canada predicts that 2016 will see record production for both lentils and dry peas. Lentil production is expected to increase by 44% to 3.42 million tonnes, and dry peas are expected to see a 34% increase, producing a record 4.29 million tonnes.

"Production numbers are still quite tentative at this point. There are dryness concerns in central Alberta and west-central Saskatchewan, key production regions, but it's likely too early to say how

much of an issue that will pose," said Penner. "The increase in seeded acres will certainly help in meeting global demand, but production still needs to be there."

Canada, like so many other regions is dependent on rain, and more accurate estimates will be available as seeding begins in late spring.

Latest Outlook Available at Pulse & Special Crops Convention

"Canadian crops go through a critical growth phase between May and June," said Murad Al-Katib, President and CEO of AGT Foods. "Once they're through that phase, there's a lot more to say about the expected yields and market outlooks. The Canadian pulse industry is holding its convention in July where traders can learn the most current information."

The Pulse & Special Crops Convention, July 6-8, 2016 in Toronto, Ontario will have a half day of programming dedicated to discussing the market outlook for pulses and other special crops.

In Canada's largest city, a direct flight away from many international locations, international traders will hear directly from Canadian market analysts and traders about the supply and demand outlook for this year, while crop is in the ground.

"It's a fascinating year for everyone in this industry – from producers, to processors, to traders and consumers," said Al-Katib. "It will be interesting to see if the projections of a record seeded area of pulses will hold true."

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Platinum subscriptions include PDF copies of all books in the monthly Export Essentials reference series. In addition to all the information given to regular subscribers, these books include tables with supply-demand and trade data for Canadian red and green lentils, as well as green, yellow and split peas. More data will be added throughout the year.

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Gafta in India

By Mrs Jaine Chisholm Caunt, Director General of Gafta and Mrs June Arnold, Head of Policy, Gafta

Gafta is an international trade association with almost 1600 members in 90 countries. Our aim is to promote international trade in agricultural commodities, spices and general produce, and to protect our members' interests worldwide. Gafta provides six key services for members:

Contracts

Gafta develops the standard forms of contract on which it is estimated that 80% of the world's trade in grain, rice and wheat is shipped. Gafta members can also become members of Gafta's committees to ensure that these contracts remain current, party neutral and reflect trade practices.

Arbitration

Gafta operates an international dispute resolution service for contractual disputes. Awards can be enforced in 149 countries under the New York Convention. Gafta members receive a discounted fee for the service and access to the defaulters list of companies who have not complied with an award.

Trade Assurance

The Gafta Trade Assurance Scheme (GTAS) is a HACCP-based scheme available to companies operating in the international grain and feed trade. Gafta members can apply to be recognised as Gafta Approved Analysts and Superintendents to be eligible to carry out work on Gafta contracts.

Trade Policy

Gafta's Trade Policy service represents members' views to authorities by providing informed opinion on legislative and policy developments through the publication of regular material on the current grain market and updates on trade issues. Gafta members can contribute to and influence Gafta's work on Policy.

Education and Training

Gafta operates the Gafta Professional Development (GPD) to increase members' understanding of international trade practices and contractual issues. Gafta members receive a substantial discount on training fees and have access to our Distance Learning Programme (DLP).

Events

Gafta runs a range of seminars and conferences, black tie events and receptions across the world to facilitate networking within the trade. Gafta members receive discounted entry to events as well as access to exclusive

members-only events and information services, as well as a bi-monthly newsletter.

Gafta is keen to work more closely with Indian companies and to promote the benefits of Gafta services. Mr Anurag Tulshan from the Indian Pulse & Grain Association joined Gafta's International Contracts Policy Committee (ICPC) last November, which provides an opportunity for Indian member companies to influence the design and development of Gafta standard contracts, as well as reporting on market conditions. Gafta ran a seminar on Arbitration at the recent IPGA conclave in Jaipur along with Gafta arbitrator Mr Shailendra Bardia. Gafta wishes to promote the use of its contracts, and also to grow the pool of Indian Gafta arbitrators to enable more arbitration hearings to be held in India. To this end, Gafta plans to return to India in the near future to hold further seminars and promote training opportunities.

There is also an opportunity to promote and support the Indian Pulses trade through Gafta's International Pulses committee and trade policy division. Gafta's pulses committee is promoting polices of free trade, and looking at food and feed safety and quality issues. The committee considers key barriers to trade around import and export restrictions and aims to facilitate the free trade of pulses globally.

Gafta is also part of the Global Pulses Confederation IYP 2016 market access and stability working group promoting the reform of Codex MRL (maximum residue level) setting which needs to be more efficient. One of Codex' most important responsibilities is its setting of international pesticide maximum residue limits. Codex plays a crucial role in enabling trade in agricultural products to the benefits of both producers and consumers. The pulses sector knows only too well the implications of a zero or default MRL set by a key import market which was experienced with a low MRL for glyphosate on lentils and severely disrupted trade between the US, Canada and EU some years ago. Such an occurrence is frequently experienced with trade in smaller crops. We are still awaiting an increased import tolerance for saflufenacil on lentils in the EU expected to apply in first quarter of 2017. Growers of pulses have emphasised that missing MRLs creates trade risk that ultimately impedes their ability to use technology to boost yields. This is particularly important for small farmers who are in a position to earn income through export trade. It is also important to food-insecure countries who cannot afford disruptions in terms of both physical and price volatility.

It is important not to underestimate the time and effort required to modify an import tolerance in any jurisdiction.

Delays in establishment of MRLs and the resulting lack of harmonisation have important consequences for market access, productivity and farmer livelihoods. For these reasons, Gafta is calling for a commitment from the leadership of FAO, WHO and Codex to increase capacity to enable Codex to perform its role. Currently the schedule for the review of new active substances is full for years to come and ideally Codex MRLs should be established soon after a new active or new use is approved by a national authority and in use on crops entering global trading system.

The trade is faced with mounting pressure as advances in testing and analytical methods are available for pesticides with more precision in technologies. An increased frequency of testing will bring more non-compliances. Setting MRLs at international level will promote trade and access to markets and move away from regional MRL constraints.

International Year of Pulses 2016 continues to be an excellent opportunity to open a dialogue on improving the regulatory framework in which trade occurs. We hope to reduce trade barrier costs that are borne by farmers, processors, traders and consumers while introducing greater efficiencies to enhance food security, reduce price volatility and enhance the return to growers. The absence of MRLs subjects the global food trade to the unpredictability of zero, near-zero, or undefined default tolerances and a commercially viable solution needs to be found and work will continue beyond IYP.

Gafta looks forward to working more closely with the Indian trade both now and in the future.

Mr Shailendra Bardia, Mr Jonathan Waters and Jaine Chisholm Caunt of Gafta in Jaipur

Canadian Pulse Production to Increase Sharply in 2016

Jonathon Driedger

Pulse markets remain in the midst of an unprecedented period as tight supplies and strong demand have driven prices to record-high levels. It's been an exciting time for pulse producers, who will respond to the prospect of highly profitable returns by planting more pulse acres than ever before.

As the world's largest exporter of peas and lentils, Canada's production outlook will be an important driver for the market going forward. The April 21st Statistics Canada seeding estimates shed light on what Prairie farmers plan on putting in the ground this spring, with the numbers largely confirming what analysts had been anticipating. In addition, dry conditions in 2015 hurt yield potential. If we see a return to trend line yields, total production could increase by even more.

Canadian pea production is set to increase significantly in 2016. Total seeded area is set to reach 4.25 million acres, up 15% from last year, and a new record. Previous highs were just below 4 million acres in 2008 and 2014. When combined with an improvement in yield from the 2015 drought-reduced level, the total crop could grow by one-third, to 4.3 million metric tonnes (MMT).

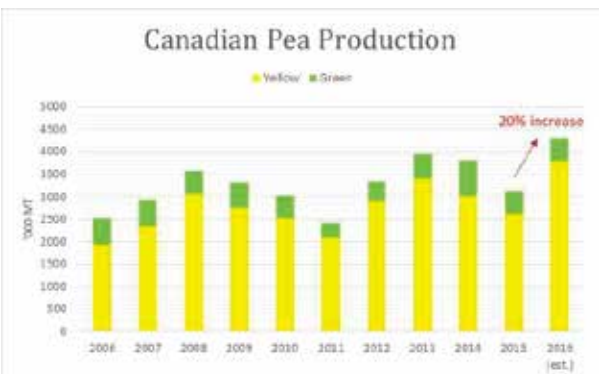
Statistics Canada did not provide a breakdown by type, but our own internal estimates suggest that all of the increase, and more, will be in yellow peas. We anticipate 3.75 million acres of yellow peas, compared to 3.1 million acres in 2015. Depending on yields, our projection is for yellow pea production to reach 3.8 MMT, an increase of over 1 MMT from 2015.

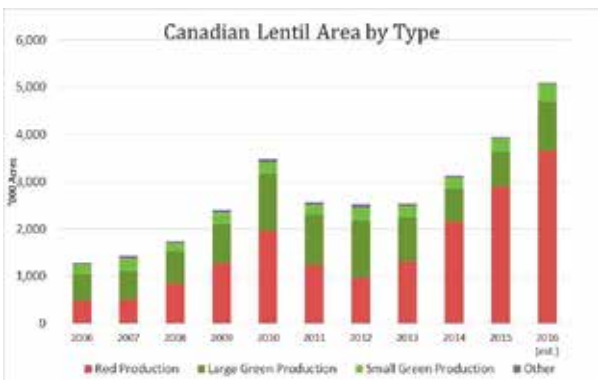
Green peas are the one pulse crop that will actually see a decrease in plantings in 2016. Record-high plantings in 2014 resulted in an excess supply overhang that carried over through the 2015 season as well. The result was a steep discount in green pea prices relative to yellows for Canadian farmers. This will discourage plantings, with our forecast of 500,000 acres in 2016. Green peas may be one of the few pulse crops to see a decrease in stocks over the course of the 2016/17 marketing year.

Lentil acres are poised to shatter all previous records. Statistics Canada estimated 5.14 million acres for 2016, roughly in-line with what had been a wide range of pre-report expectations. Seeded area in 2015 was already a historic high, but its 3.95 million acres will see an

additional 30% increase this spring. The five-year average for lentil acres is less than 3 million. When taking into account the potential for better yields, aggregate lentil production could hit 3.34 MMT, an increase of 40%.

As with peas, Statistics Canada didn't break down lentil area by type. Our expectation is that red lentils will constitute the largest increase. We anticipate 3.65 million acres of red lentils to get planted on the Prairies this spring, compared to 2.89 million acres in 2015, and a longer term average that is closer to just 1.7 million acres. Depending on yields, the crop could reach 2.5 MMT, a 40% increase from last year, and more than double the longer term average.





Large green lentils will also see a sizeable increase in percentage terms. We are projecting 1.05 million acres to be planted, compared to 750,000 acres in 2015. However, this isn't unusually large from a historical standpoint, with each year from 2010 to 2012 seeing over a million acres seeded in Canada. We project production to reach 624,000 tonnes, an increase of nearly 50% from 2015. Small green lentil area will grow to 380,000 acres, from just 260,000 acres in 2015. We anticipate that there is less risk of stocks building to burdensome levels for large and small green lentils than might be the case for red lentils.

There are several reasons why the biggest increase in lentils will flow into reds. First, red lentils can be grown in more areas of Western Canada than green lentils. Lentils already constituted a large portion of the acres in the core regions in 2015, so much of the increase will be in areas that aren't traditionally lentil growing areas, meaning that reds are the only viable option on those farms.

In addition, red lentils have relatively less quality risk at harvest than green lentils. Considering that more acres are being planted in peripheral areas, perhaps by growers that haven't planted lentils in several years, and/or being seeded more aggressively than normal rotation plans would allow due to high prices, the quality

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consideration plays a bigger role in decisions than they sometimes have in the past.

The growth in production in non-traditional areas and by less experienced growers does have the potential to affect the size and quality of this year's harvest. We have adjusted our yield expectations down slightly to reflect this. In addition, it's possible that the portion of the crop achieving the top two grades could fall below the long-term average of 75%. However, this won't be known until after harvest, and weather conditions will be a bigger impacting factor by far.

Within the expectation of a huge increase in production, there are a few dynamics that will be watched closely in the coming months, beyond the obvious uncertainty around weather. First, with the exception of green peas, supplies of all types of pulses will be extremely low going into harvest. The fact that there is no cushion going into harvest means the market is setting up for another very large shipping program in the fall. There have already been large commitments made, and more business will likely be done. In essence we will see a huge supply intersect with enormous demand. How this all unfolds, and its resulting effect on prices, logistics and other factors remains to be seen.

Longer term, many are wondering what export demand might be like as we move into mid-winter and beyond. How might a return to more normal monsoon rains affect Indian import demand for Canadian pulses through the second half of the 2016/17 marketing year? Will other import destinations pick up any shortfall, particularly given the larger supply that needs to be moved? How might government policy decisions in India or other countries affect trade? What is the impact of bigger crops in other countries that have either been traditional or newly emerged participants in the pulse export market, including the Former Soviet Union, France, Australia and others? These are questions that won't be answered for months, and yet will have a large impact on pulse trade over the coming year.

The upcoming season promises to be another dynamic one for the entire pulse market. High prices are offering the hope of profitable returns for farmers, while the increase in production may allow for the supply chain to be replenished. All of this is taking place in the midst of growing global demand. Canadian farmers and industry players are excited to be a part of it.

the pulses conclave 2016 JAIPUR

AN INTERNATIONAL EVENT

The Pulses Conclave 2016, Jaipur

Poonam Vij

India Pulses & Grains Association (IPGA), the apex body of India's pulses and grains industry and trade, successfully hosted THE PULSES CONCLAVE – 2016 at Jaipur Exhibition & Convention Centre, Jaipur from February 17th to 19th, 2016.

The Conclave witnessed attendance from over 1,200 delegates and trade delegations from 28 countries like Canada, the United States of America, Africa, Australia and Asia to name a few.

On 17th February, 2016, the evening began with a welcome address by IPGA Chairman, Mr. Pravin Dongre, followed by official International Year of Pulses (IYP 2016) launch in India by Ms. Robynne Anderson. The keynote presentation was addressed by Mr. Huseyin Arslan, President of Global Pulse Confederation and Executive Chairman- AGT Foods. Hon'able Minister Lyle Stewart delivered a speech and Mr. G Chandrashekhar delivered the special address.

A Life-time achievement award was presented to Shri Seth Deepchand Ji Parakh of 'Parakh Group of Companies' in recognition for services to the industry. Parakh Group of Companies which includes 'Poona Dal and Besan Mills Pvt Ltd' and 'Parakh Agro Industries Ltd' has completed 50 years in pulses processing. On behalf of Shri Seth Deepchand Ji Parakh, the award was received by Mr. Sujit Parakh. The evening concluded with a vote of thanks by IPGA Vice-Chairman, Mr. Bimal Kothari.

The Conclave showcased luminaries of the agricultural world from across the globe, who shared their domain expertise by being a part of the seminars and business sessions on 18th and 19th February, 2016. The Seminar consisted of stimulating presentations from business leaders and a series of engaging panel discussions by domain experts, agribusiness professionals, researchers and service providers. The key topics covered were global agri-market drivers, price and market outlook, research initiatives, advances in processing technology and more. Some of these presentations included Origin presentation for India by Mr. G Chandrashekhar - Economic Advisor - IMC and Member - SEBI CDAC; Strategy for increasing pulses production by Dr. J S Sandhu, Deputy Director General (Crop Science) - ICAR; Improving Profitability for Farmers and Nutrition for Consumers by Dr. David Bergvinson - Director General – ICRISAT; Agriculture and Food Security - Where research can make a difference by


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Dr. Kevin Tiessen – IDRC; Presentation on GAFTA by Ms. Jaine Chisholm Caunt, Director General – GAFTA and so on. The Title sponsor for the Conclave was Arvee International Pte Ltd.

IPGA is proud to have signed Memorandum of Understanding with International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International trade Center (ITC) and Overseas Agro Traders' Association of Myanmar (OATAM). These MoUs surely widen the scope of work and exposure for IPGA at a global level by supporting pulses and crop based research.

An exhibition was also set up to display products and technology from across the world. The exhibition provided the right setting to showcase products and services from the world of pulses.

During the Conclave, IPGA launched celebrations of the International Year of Pulses by conducting an all India level Pulse Food Innovation contest, co-hosted with McGill Centre for the Convergence of Health and Economics MCCHE and supported by Government of Saskatchewan. The live food contest was conducted with 6 shortlisted teams from the four zones of India, where team IHM, Bangalore won the title of the National Winner. IPGA is associated with CICILS in promoting the IYOP 2016 in India.

On 18th evening a Gala Dinner and Entertainment Night sponsored by ETG Agro Pvt Ltd was organised by inviting world renowned mentalist Amir Lustig, performances by Banjara School Dance and stand-up comedian, Jeeveshu Ahluwalia.

Overall, The Pulses Conclave 2016 proved to be a colossal success with a 25% increase in delegate attendance, consistently from the previous Conclaves. IPGA has announced that the next Pulses Conclave will be in 2018. All presentations can be viewed and downloaded from the IPGA website. Please visit http://www.ipga.co.in/pulsesconclave

Strategy for Enhancing Production and Productivity of Pulses

J. S. Sandhu, S. K. Jha and B. B. Singh
Crop Science Division, ICAR, Krishi Bhawan, New Delhi

The grain legumes belong to the family leguminosae are high value and low input requiring crops and play vital role in crop diversification. The plants of this species have a group of bacteria, Rhizobium in their roots which are able to utilize atmospheric nitrogen by a process called symbiosis, which occurs in the root hairs. The dry seeds (whole or split) of some grain legumes are called pulse. The pulse crops occupy a unique position in the world agriculture by virtue of their 2 to 3 times higher protein content (20 to 25%) than cereals and their capacity to fix atmospheric nitrogen. In developed countries, pulses are important indirect source of protein as animal feeds, however, for many developing countries it is a cheap and readily available source of dietary protein. In India, about a dozen pulses are grown as an integral part of different cropping systems and significantly contribute to the sustainability of cereal-based cropping systems and important for the nutritional security vegetarian diet of large Indian population.

Production trends and projection for requirement of pulses in 2020 and 2025

There had not been much increase in the area of pulses during the past 60-65 years till 2011-12, when an increase of about 2.0 mha was recorded. Total production of pulses has also remained static in the range of 10 to 13 mt. In 2013-14, the area, production and productivity of pulse crops in India was 25.2 mha, 19.3 mt and 764 kg/ha, respectively. However, a significant increase in productivity has been achieved (from 598 kg/ha in 2005-06 to 764 kg/ha in 2013-14) and consequently production has substantially increased during the past six-seven years. The growth rate in pulse production (2.61%) during this decade was even higher than the growth rate of rice (1.6%), wheat (1.9%) and all the cereals (1.9%). In order to ensure self-sufficiency, the pulse requirement in the country is projected at 23.5 and 27.5 mt including 20.54 and 23.15 mt pulses for direct consumption for an estimated population of 1.35 and 1.41 billion at the rate of 15.33 and 16.42 kg/person/annum by the year 2020 and 2025, respectively.

Costraints in pulses' production

Detoriating production base: Most of the cultivated areas have started showing signs of stress with production fatigue and deterioration of soil. In many such areas, yields have started declining because of deceleration in total factor productivity,

decline in organic matter content in soil and emergence of multi-nutrient deficiencies. The deficiency of micronutrients, especially sulphur and zinc is widespread among pulse-growing regions. Out of 137 pulse-growing districts, 87 districts show 20–60% sulphur deficiency. About 50% pulse growing districts having Zn deficiency. About 40% of the pulse-growing regions have low to-medium population of native Rhizobium.

Resurgence to insect pest and disease: An array of diseases (wilts, root rots, stem rots, downy mildews, powdery mildews, leaf spots, blights, rusts, mosaics and stunted growth resulting from attack by root knot nematodes) caused by fungi, bacteria, viruses and nematodes adversely affect the yielding potential of the pulse crops. However, some of these diseases like Fusarium wilt in chickpea and pigeonpea, MYMV in mungbean and black gram are damaging these crops throughout the country. Similarly the insect-pests like pod-borers damage chickpea and pigeonpea in the entire country. Storage grain pest cause damage to the grains of all pulse crops during storage.

Abiotic stresses: Pulse crops are grown on marginal lands under rainfed agriculture, hence are prone to abiotic stresses. They are sensitive to temperature stress especially at full bloom stage and exposure to high temperature and moisture stresses which are responsible to heavy yield reductions. Winter pulses like chickpea, lentil and fieldpea are often prone to intermittent and terminal drought. Pigeonpea is very sensitive to water-logging at seedling stage in all maturity groups (early, medium and late) and to low or high temperature stress at reproductive stage in medium and late maturity groups.

Status and acievements of pulses' improvement Research

Pureline selection: Before 1950, virtually all the varieties were developed by selection of superior genotypes from the samples of local cultivar being grown by the farmers. Some of the varieties were also developed from the exotic materials. The desirable plants used to be selected and after progeny testing, superior purelines used to be established after evaluation for yield, yield traits and reaction to diseases, before their release for cultivation. This practice continued even after the establishment of All India Coordinated Pulse Improvement Project (AICPIP) in 1966-67.

Intra-specific hybridization: From hybridization, total 134 varieties in chickpea, 69 in mungbean, 62 in pigeon pea, 36 in black-gram, 34 in fieldpea and 24 in lentil have been developed. Of them, barring one variety in chickpea, six in mungbean and two in black gram, which were produced from inter-specific

hybridization, the rest of the varieties were the outcome of intra-specific hybridization. Developed cultivars have improved traits like seed size, early maturity and plant types etc.

Inter-specific hybridization: The wild species/relatives have also been used for the genetic enhancement of the cultivated varieties of pulse crops particularly to increase variation beyond parental limits, developing CMS system and to transfer gene(s) for different stresses. There are several wild species of chickpea (*Cicer reticulatum)* and pigeonpea *(Cajanus scarabaeoides, Cajanus sericeus, Cajanus scarabaeoides, Cajanus volubilis and Cajanus cajanifolius)* and *Vigna* (*(Vigna radiatae* var. *sublobata and V. mungo* var. *sylvestris)* reported to possess useful genes for different stresses, however, only few have been exploited for practical significance.

Mutation breeding: Induced mutations have been found useful in creating useful variability for yield traits, plant type and resistance to various stresses. So far, 52 varieties have been developed through mutation breeding in different pulse crops mostly from already released and adapted varieties. Gamma-irradiation, in general, have been used for mutation.

Transgenic development: Efforts have been made to make chickpea and pigeonpea transgenics for Helicoverpa resistance using cry1Aabc and cry1Ac. Two other gene constructs like cry2Aa and cry1Ab were also used for developing transformants for incorporating resistance in Chickpea. This work has been undertaken in several laboratories but transforming events are still in primary stages. Besides Helicoverpa resistance, drought tolerance in chickpea and blackgram using DREB1A and nematode tolerance in fieldpea using RNAi techniques are underway at ICRISAT and JNU, respectively.

Genomics enabled improvement: During the last two decades powerful genetic and genomic tools such as establishment of genetic and physical maps, expressed sequence tags (ESTs), bioinformatic tools, genome-wide sequence data, genomic and metabolomic platforms have been developed for many legume species. Recently, draft genome sequence has been made available in pigeonpea, chickpea and mungbean. Efforts are currently underway in lentil as well.

Use of molecular markers in improvement of pulses: With the discovery of reliable molecular markers linked to the traits (STS, SSRs, RFPLs, RAPDs, CAPS, dCAPS), it is now possible to capture allelic variation in the form of QTLs which can be transferred into superior agronomic base. In India, a slow but definite progress is being made in developing genomic resources which will lead to use of such resources in precision breeding. With the development of whole

genome sequencing information in chickpea and pigeonpea, the marker assisted breeding is now being routinely used in chickpea.

Strategy for increasing pulses production

In order to achieve self-sufficiency in pulses, the projected requirement by the year 2025 is estimated at 27.5 mt. To meet this requirement, the productivity needs to be enhanced to 1000 kg/ha, and an additional area of about 3-4 mha has to be brought under pulses. This, however, requires a proactive strategy from different stakeholders for boosting per unit productivity of land with reduced cost of production. The strategies given in Tables 2, 2a & 2b require immediate attention, which can have substantial bearing on pulse production of the country.

Table 2. Approches and target for achieving self sufficiency

Approach	Target	Target by 2020	Target by 2025
Productivity enhancement	Improving productivity from 764 to 1000 kg/ha	Production: 23.5 mt Productivity: 900 kg/ ha	Production: 27.5 mt Productivity:1000 kg/ha
Area expansion	Bringing 3-4 mha additional area over the existing 24 mha	26 mha	27.5 mha

Table 2a. Activities envisaged under productivity enhancement approach

Approach	Activities envisaged
Dissemination of existing technology	Adoption of existing technology for bridging the yield gap
Institutional/ Policy support	Improving Seed Replacement Rate (SRR) Provision for life saving irrigation in pulse districts Ensuring availability of critical inputs Mechanization for pulses production Policy Support for value chain
Research strategy	Integrated breeding for development of HYVs Development and validation of location specific and cost effective crop management practices

Table 2b. Activities envisaged under increasing the area of cultivation approach

S. No.	Potential crop/cropping systems/ niche	Specific area	Potential area (mha)
1.	**Intercropping**		
	Mungbean + Sugarcane (IR); & Mungbean + Cotton/ millets (RFU)	UP, Bihar MS, AP & TN	0.70
	Pigeonpea+soybean/cotton/ sorghum/millets/groundnut (RFU)	AP, MP, MS, Karnataka, TN	0.50
	Chickpea+barley/ mustard/ linseed/safflower (RF)	Rajasthan, Punjab, Haryana, UP, Bihar, MS	0.50
	Chickpea/lentil with autumn planted/ratoon sugarcane	MS, UP, Bihar	1.00
2.	**Catch crop**		
	Mungbean spring/ summer	UP, Haryana, Punjab, Bihar, WB	1.00
3.	**Rice fallow**		
	Chickpea	UP, CG, WB, Bihar, Jharkhand, Orissa	0.40
	Urdbean/ mungbean	AP, TN, Odisha, Karnataka	0.50
	Lentil	UP, Bihar, WB, Assam, Jharkhand	0.30
	Lentil/fieldpea	North-East	0.10
4.	**Kharif fallow**	Urd/mung in UP (Bundel.), MP	1.20
		Total	**6.20**

AP: Andhra Pradesh; MP: Madhya Pradesh; TN: Tamil Nadu; CG: Chhattisgarh; WB: West Bengal; MS: Maharashtra; UP: Uttar Pradesh;

Technology drivers for enhancing productivity of pulses: Improved varieties of pulses can increase productivity by 20–25%, whereas production package technology up to 42% over the farmers' practices as shown by the frontline demonstrations conducted across the country. Improved production technologies like raised bed planting, ridge furrow planting, seed treatment with Rhizobium, application of sulphur @ 20 kg/ha, pre-emergence application of pendimethalin @ 1–1.25 kg/ha, foliar spray of 2% urea/ DAP and bio-intensive IPM modules have been validated.

Success Story 1:

Spring/summer mungbean in cereal-based cropping system of UP: Around 50,000 ha area has come under spring/ summer mungbean in cereal-based cropping systems of Fatehpur district within a short span. In 2008, farmers harvested 1200-1400 kg/ha mungbean with "Samrat" and "Meha" varieties in 65 days and earned Rs 50-60,000/ ha under large scale demonstrations conducted by IIPR, Kanpur. Countrywide the area, production and productivity of spring/ summer mungbean has increased substantially from 6.6 lakh ha, 2.6 lakh tonnes and 404 kg/ha in 2010-11 to 10.50 lakh ha, 6.45 lakh tonnes and 620 kg/ha in 2013-14, respectively. The efforts need to be replicated.

Success story 2.

Chickpea cultivation in Andhra Pradesh: The area of chickpea in Andhra Pradesh has increased from 0.71 lakh ha in 1992–93 to 5.86 lakh ha in 2013–14 (more than eight times) and productivity from 621 to 1439 kg/ha (more than double). This is a phenomenal increase, which could be possible due to appropriate short duration varieties, availability of quality seeds, necessary infrastructure and effective transfer of technologies. The efforts need to be replicated.

Conclusions

Compared to cereals, yield breakthrough in pulses has not been achieved, although breeding efforts in the past were rewarding in terms of insulation of varieties against major diseases and reducing crop duration which has helped stabilizing the yield and promoting crop diversification and intensification. For a major breakthrough in yield, there is urgent need to broaden the genetic base through prebreeding; development of CMS-based pigeonpea hybrids; MAS for yield, grain quality and resistance to stresses; transgenics of chickpea and pigeonpea for *Helicoverpa* pod borer and drought; and genomic studies.

To achieve self sufficiency in pulses, the productivity needs to be enhanced to 1000 kg/ha by the end of 2025, and an additional area of about 3-4 mha has to be brought under pulses besides reducing post-harvest losses. In order to do so, popularization of promising varieties of seeds and new agronomic practices besides ensuring remunerative price of pulses with procurement seems indispensable alongwith the involvement of different stakeholders.

Agricultural Statistics Division
Directorate of Economics & Statistics
Department of Agriculture, Cooperation and Farmers welfare
Third Advance Estimates of Production of Foodgrains for 2015-16

As on 09.05.2016

Million Tonnes

Crop	Season	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15		2015-16	
													3rd Adv. Est.	2014-15 (Final)	Targets	3rd Adv. Est.
Rice	Kharif	78.62	72.23	78.27	80.17	82.66	84.91	75.92	80.65	92.78	92.37	91.50	89.62	91.39	92.10	90.59
	Rabi	9.91	10.90	13.52	13.18	14.03	14.27	13.18	15.33	12.52	12.87	15.15	12.91	14.09	14.00	12.77
	Total	88.53	83.13	91.79	93.36	96.69	99.18	89.09	95.98	105.30	105.24	106.65	102.54	105.48	106.10	103.36
Wheat	Rabi	72.16	68.64	69.35	75.81	78.57	80.68	80.80	86.87	94.88	93.51	95.85	90.78	86.53	94.75	94.04
Jowar	Kharif	4.84	4.04	4.07	3.71	4.11	3.05	2.76	3.44	3.29	2.84	2.39	1.93	2.30	3.10	1.87
	Rabi	1.84	3.20	3.56	3.44	3.81	4.19	3.93	3.56	2.69	2.44	3.15	2.85	3.15	2.75	2.72
	Total	6.68	7.24	7.63	7.15	7.93	7.25	6.70	7.00	5.98	5.28	5.54	4.79	5.45	5.85	4.59
Bajra	Kharif	12.11	7.93	7.68	8.42	9.97	8.89	6.51	10.37	10.28	8.74	9.25	9.00	9.18	9.50	8.25
Maize	Kharif	12.73	11.48	12.16	11.56	15.11	14.12	12.29	16.64	16.49	16.19	17.14	16.26	17.01	17.25	15.50
	Rabi	2.25	2.70	2.55	3.54	3.85	5.61	4.43	5.09	5.27	6.06	7.11	6.48	7.16	6.50	5.53
	Total	14.98	14.17	14.71	15.10	18.96	19.73	16.72	21.73	21.76	22.26	24.26	22.74	24.17	23.75	21.02
Ragi	Kharif	1.97	2.43	2.35	1.44	2.15	2.04	1.89	2.19	1.93	1.57	1.98	1.90	2.06	1.80	1.86
Small Millets	Kharif	0.56	0.48	0.47	0.48	0.55	0.44	0.38	0.44	0.45	0.44	0.43	0.37	0.39	0.52	0.43
Barley	Rabi	1.30	1.21	1.22	1.33	1.20	1.69	1.35	1.66	1.62	1.75	1.83	1.63	1.61	1.78	1.62
Coarse Cereals	Kharif	32.22	26.36	26.74	25.61	31.89	28.54	23.83	33.08	32.44	29.79	31.20	29.46	30.94	32.17	27.91
	Rabi	5.39	7.10	7.33	8.31	8.86	11.49	9.72	10.32	9.58	10.25	12.09	10.96	11.92	11.03	9.87
	Total	37.60	33.46	34.07	33.92	40.75	40.04	33.55	43.40	42.01	40.04	43.29	40.42	42.86	43.20	37.78
Cereals	Kharif	110.84	98.59	105.01	105.78	114.55	113.45	99.75	113.73	125.22	122.16	122.70	119.09	122.34	124.27	118.50
	Rabi	87.45	86.64	90.21	97.30	101.46	106.45	103.70	112.52	116.98	116.63	123.09	114.65	112.53	119.78	116.67
	Total	198.28	185.23	195.22	203.08	216.01	219.90	203.45	226.25	242.20	238.79	245.79	233.74	234.87	244.05	235.17
Tur	Kharif	2.36	2.35	2.74	2.31	3.08	2.27	2.46	2.86	2.65	3.02	3.17	2.71	2.81	3.67	2.60
Gram	Rabi	5.72	5.47	5.60	6.33	5.75	7.06	7.48	8.22	7.70	8.83	9.53	7.59	7.33	9.50	7.48
Urad	Kharif	1.20	0.95	0.90	0.94	1.12	0.84	0.81	1.40	1.23	1.43	1.15	1.20	1.28	1.29	1.15
	Rabi	0.27	0.38	0.35	0.50	0.34	0.33	0.42	0.36	0.53	0.47	0.55	0.50	0.68	0.52	0.73
	Total	1.47	1.33	1.25	1.44	1.46	1.17	1.24	1.76	1.77	1.90	1.70	1.70	1.96	1.81	1.88
Moong	Kharif	1.43	0.81	0.69	0.84	1.25	0.78	0.44	1.53	1.24	0.79	0.96	0.89	0.87	1.10	1.02
	Rabi	0.28	0.25	0.26	0.28	0.27	0.26	0.25	0.27	0.40	0.40	0.65	0.50	0.64	0.61	0.56
	Total	1.70	1.06	0.95	1.12	1.52	1.03	0.69	1.80	1.63	1.19	1.61	1.39	1.50	1.71	1.59
Other Kharif Pulses	Kharif	1.18	0.61	0.54	0.70	0.96	0.80	0.49	1.33	0.93	0.62	0.71	0.72	0.77	0.99	0.71
Other Rabi Pulses	Rabi	2.48	2.32	2.31	2.29	2.00	2.23	2.31	2.27	2.40	2.73	2.53	3.27	2.77	2.37	2.80
Total Pulses	Kharif	6.16	4.72	4.86	4.80	6.40	4.69	4.20	7.12	6.06	5.91	5.99	5.52	5.73	7.05	5.49
	Rabi	8.74	8.41	8.52	9.40	8.36	9.88	10.46	11.12	11.03	12.43	13.25	11.87	11.42	13.00	11.57
	Total	14.91	13.13	13.38	14.20	14.76	14.57	14.66	18.24	17.09	18.34	19.25	17.38	17.15	20.05	17.06
Total Foodgrains	Kharif	117.00	103.31	109.87	110.58	120.96	118.14	103.95	120.85	131.27	128.07	128.69	124.60	128.06	131.32	123.99
	Rabi	96.19	95.05	98.73	106.71	109.82	116.33	114.15	123.64	128.01	129.06	136.35	126.52	123.96	132.78	128.24
	Total	213.19	198.36	208.60	217.28	230.78	234.47	218.11	244.49	259.29	257.13	265.04	251.12	252.02	264.10	252.23

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