### Chickpea Value Chain—A Study

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# With its increasing demand, its high nutritious value and ability to grow in drought conditions, the chickpea provides a viable and sustainable option for farmers in rain-fed areas

Pulses are consumed widely in India and *chana*, or chickpea, tops the list. The chickpea, a light brown pulse, known also as Garbanzo bean, is a good source of protein. It is used for making flour in many parts of the world. The crop has the capacity to grow in drought conditions and does not need nitrogen fertilizers. Chickpea is a highly nutritious pulse and is placed third in the list of importance of legumes cultivated in the world. It contains 25 per cent proteins, which is the maximum provided by any pulse, and 60 per cent carbohydrates. The variety of the chickpea is determined by its size, colour and taste. Two of these varieties, namely, the *kabuli* and the *desi*, are very important in terms of their usage and commercial purposes. India mostly produces the *desi* chickpeas and not the *kabuli*.

- **Desi chickpeas:** These are split peas, and are relatively small in size, with a thicker seed coat than the *kabuli*. These chickpeas are dark brown in colour and can be used and served in many ways.
- *Kabuli* chickpeas: These have a whitish-cream colour, are relatively bigger in size and have a thinner seed coat. *Kabuli* chickpeas are generally used in soups and salads or to make flour.

In India, the seeds for chickpeas are sown from September to November. The maturity period of the *desi* type is 95–105 days and of the *kabuli* type is 100–110 days. The harvesting of the plant is done when its leaves start drying and shedding in February, March and April.

#### CHICK PEA MARKET: ATTRACTIVENESS FOR INDIA

The demand for chickpeas in India is expected to grow at two per cent per annum over the next five years, owing to the growth in population as well as consumers choosing the relatively affordable chickpea over costlier pulses. The increased demand will put an upward pressure on prices; however, the current scenario suggests that this growth will mainly be met by imports.

- Historically, the demand for chickpeas has grown, in line with the growth in population (the annual rate of population growth is 1.5 per cent).
- Chickpea is a cheaper pulse and will always be preferred by a large segment of the population—urban or rural.

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 The increased income of the population will lower the overall demand for *desi* chickpea, which is essentially a cheaper source of protein.

Domestic production is likely to grow at 1.2 per cent over the next five years, due to the low profitability of the crop, relative to other *rabi* crops, putting an upward pressure on prices.

- By 2015, there will be an additional demand of 8,00,125 MT. The demand will need to be met through new acreage, greater productivity or imports. With low profitability from the crop (Rs 1,200 to Rs 6,500 per ha), the primary growers will keep producing at sub-optimal levels and, thereby, cause domestic supply shocks.
- The acreage under chickpea cultivation has always been small at six per cent of the overall net sown area and is likely to remain so due to the low profitability and its secondary contribution to food security for the farmers.
  - □ Increasing the supply through new acreage will require an additional 3.32 million ha under chickpea cultivation (a 13 per cent increase from the current level). This expansion in acreage is very unlikely because chickpea is less profitable at Rs 1,200–6,500 per ha compared to wheat, which provides both—a greater income of Rs 6,500–21,000 per ha as well as food security and fodder.

- The lack of investment in practices and technologies, in comparison to other crops such as wheat, means that there are few new technologies on the horizon that will dramatically improve chickpea productivity or returns.
- Productivity is very low, at an average of 0.788 MT per ha, and falters in comparison to countries such as Australia and neighbouring Myanmar.

India's productivity is currently low compared to other chickpea producing nations, with yields at 32 per cent lower than neighbours such as Myanmar, which has made giant strides in the last five years, and 25 per cent lower than best class nations such as Australia. The application of known practices and inputs can easily meet the incremental demand requirement. However, large-scale intervention will be required across a relatively fragmented production base, as is the case in Myanmar.

Myanmar is a case example of the chickpea productivity improvement. It has almost doubled its chickpea production from 1,19,000 MT to almost 2,20,000 MT from 2000 to 2002. In the same period, it enhanced its productivity from 700 kg per ha to almost 1,100 kg per ha (a 40 per cent improvement) and witnessed more than 30 per cent expansion in acreage. One of the major reasons for its increased production has been its proximity to India, which has a huge demand for chickpea (a third of the world's total chickpea imports) and a low production of the crop. Lesser flood irrigation requirements, appropriate soil gualities and its proximity to such a huge market have facilitated Myanmar's progress in becoming a major chickpea exporting nation. This has also been facilitated by the fall of the socialist

regime in Myanmar (post 1988). Trade has become easier and, therefore, India is a major market of chickpea exports from Myanmar.

As a result of low productivity in India, farm gate prices in India are at least 23 per cent higher than those of Australian and Myanmar's chickpeas, making low-cost imports an attractive alternative to local production. India's productivity is currently low compared to other chickpea producing nations, with yields at 32 per cent lower than neighbours such as Myanmar, which has made giant strides in the last five years, and 25 per cent lower than best class nations such as Australia.

**Segment A:** Irrigated wheat diet-based families. Chickpea is among the crops with the highest potential; currently, most engage with desi chickpea cultivation but have a high potential for growth of the *kabuli* chickpea cultivation (30 per cent of cultivators).

Segment B: Irrigated nonwheat diet-based families. Low growth potential because chickpea will always give lower returns than other potential irrigated crops such as vegetables.

**Segment C:** Un-irrigated paddy, maize and soybean with chickpea with a wheat-based diet. In the absence of irrigation, chickpea is among the highest potential crops (60 per cent of the chickpea cultivators).

**Segment D:** Un-irrigated paddy (*kharif*), maize, soybean and un-irrigated wheat (*rabi*) on black soils and chickpea if extra land with a wheat-based diet. In the absence of irrigation, chickpea is among the highest potential crops. Currently, cultivating *desi* chickpea although there is potential for the growth of *kabuli* chickpea cultivation (eight to nine per cent of the chickpea cultivators).

**Segment E:** Un-irrigated *kharif* fallows and chickpea (*rabi*) with a wheat-based diet. In the absence of irrigation, chickpea is among the highest potential crops (one to two per cent of the chickpea cultivators).

**Segment F:** Un-irrigated *kharif* paddy and *rabi* fallow with a non-wheat-based diet. Chickpea cultivation is not viewed as a viable

- Farm gate prices in Australia and Myanmar are estimated to be at least 20 per cent lower than in India.
- Whatever portion of the projected supply and demand imbalance that is not met by marginal yield improvements will, therefore, most likely be met by imports from Australia (existing exporter) and Myanmar (which has recently begun surplus production).

#### CHICKPEA CULTIVATION: ATTRACTIVENESS FOR SMALLHOLDERS

Neither the *desi* nor the *kabuli* chickpea is an attractive livelihood option for small-holder farmers in their current state, due to the relatively high risk and the low returns. However, only for limited segments of *desi* chickpea cultivators is chickpea among the most attractive livelihood options, with some potential to expand into cultivation of *kabuli* chickpea.

There are six major segments of small-holder farmers; within these segments, chickpea appears to be the most preferred crop for only four segments, representing approximately 10 million farmers. alternative to migration and wage labour unless it can ensure a minimum return at a lower risk profile.

*Desi* chickpea is the dominant variety in India, representing 95 per cent of the current acreage. However, there are many impediments to its growth because it is not a highly attractive option for smallholders, due to the relatively low profitability and its minor contribution to food security.

- Ninety-five per cent of the chickpea is cultivated in six states: Madhya Pradesh, Maharashtra, Rajasthan, Andhra Pradesh, Uttar Pradesh and Karnataka.
- *Desi* chickpea is grown majorly in 6.4 million ha of land by farmers in segments A as well as farmers with unirrigated land with lighter soils and without irrigation infrastructure in segments C, D and E.
- Farmers in rain-fed areas prefer the *desi* chickpea for its relatively low investment and input requirement as well as its drought tolerance.
- However, in its current state, the *desi* chickpea will continue to be a secondary crop due to its low returns (51 per cent lower than wheat and 47 per cent lower than vegetables), relatively high risk (50 per cent greater price volatility in chickpea) and comparatively low contribution to food security.
- There is potential for increasing the production of *desi* chickpea by improving productivity and profitability by up to 40 per cent (Rs 10,000) in rain-fed conditions. However, this will only make sense to farmers for whom chickpea is among the highest potential crops, namely, the 10 million farmers in segments C and E.

• For the segment that has irrigation (segment A), it can be a good option only for farmers who live in remote areas, are not well connected to markets and have excess land after having sown wheat. Chickpea has a longer shelf life than vegetables and, therefore, provides farmers with a robust option.

The demand for *kabuli* chickpea is expected to grow significantly with increased urbanization. It has the potential for improved returns to chickpea farmers although its prevalence among growers has been limited by the lack of varieties suitable to the Indian climate, by it being primarily an irrigated crop and by its low contribution to the food security situation of the smallholder and marginal farmer; therefore, in its current state, it is not viable.

- *Kabuli* chickpea represents only five per cent of acreage and is mainly found in black cotton soils in Madhya Pradesh, parts of Maharashtra and Andhra Pradesh.
- *Kabuli* chickpea is grown in approximately 0.5 million ha by farmers in segment A.
- In India, the *kabuli* chickpea is preferred by farmers who have land with heavier soils and assured sources of irrigation. The 'dollar' variety of seed thrives only with irrigation and makes financial sense for those farmers who have to account for higher seed rates and higher inputs due to the variety being uncertified.
- The acreage under *kabuli* chickpea cultivation is likely to increase by only five to ten per cent at the expense of the *desi* chickpea over the next five years because only farmers who have land with heavier soils and sources of



irrigation will be able take advantage of its comparatively attractive returns (50 per cent higher than the *desi* chickpea), and actually take to growing the *kabuli* chickpea. Although incomes are rising, the structural issues in the pulse sector as well as the risks and higher investments by small-holders will keep the kabuli chickpea out of the reach of the masses.

Though the yields are the same, the *kabuli* chickpea fetches better prices in the markets (Rs 5,000 to 6,000 per quintal), which are 50 to 60 per cent higher than the prices of the *desi* varieties. Going by the prevalent conditions, the domestic supply of the *kabuli* chickpea will decrease (in the absence of appropriate varieties), thereby causing supply shocks. The demand will then have to be fulfilled by imports.

The demand too will remain moderate, despite rising urban populations. Although incomes are rising, the structural issues in the pulse sector as well as the risks and higher investments by small-holders will keep the kabuli chickpea out of the reach of the masses. The cultivation of the kabuli chickpea needs an investment of Rs 24,500 per ha (as compared to Rs 13,000 for the *desi* variety), which is almost 80 per cent more. Poor and erratic monsoons also force farmers, even in the Malwa region, to opt for the desi chickpea instead of the un-irrigated kabuli variety. No appropriate seed variety is available with the desired output characteristics. The one which is available is a non-certified variety, which is suffering from dwindling yields and high input costs. The farmers in segment A are the ones for whom the *kabuli* chickpea is a very good option because they have extra land as well as assured irrigation to invest in this new crop. This segment will make up about 30 per cent

of the overall chickpea cultivators. A similar but a very small window (about two per cent) also exists in segment D (for example, in Malwa) where farmers without irrigation but with heavier black soils will be able to take up cultivation

of *kabuli* chickpea as long as they have sufficient landholding to meet their wheat needs.

#### OPPORTUNITIES TO CREATE OR SHIFT VALUE IN THE CHICKPEA VALUE CHAIN

For the 10 million cultivators with over 7.5 million ha of land under chickpea cultivation, there is opportunity to improve productivity by almost 33 per cent (rain-fed) and 25 per cent (irrigated) and achieve at least five times higher profitability by intervening in production processes (by way of better extension services, better varieties), shifting to the *kabuli* varieties, bulk input procurement and investing in bulk storage facilities for farmers.

Of the eight opportunities identified to create or shift the value for chickpea cultivators, there are four high potential opportunities.

#### **DEVELOP BETTER VARIETIES**

Higher drought tolerant and wilt-, blight-, dry root- and rot-resistant varieties need to be developed for farmers of the *desi* variety. The purer form of the 'dollar' variety needs to developed indigenously so that the *kabuli* chickpea produced in India has the necessary output characteristics (higher seed weight, larger seed size, etc.). This step can help the farmers garner up to Rs 10,000 additional revenue from a hectare in irrigated conditions and Rs 8,000 extra in the rain-fed areas. **SUPPORT FARMERS FOR TRANSITION TO**  35

#### KABULI WHEN APPROPRIATE

Wherever there are farmers, who have excess irrigation, after having ensured their food sufficiency, and where owing to remoteness, other more remunerative options are not possible (vegetables, etc.), it will be necessary to intervene and handhold these farmers into taking up the *kabuli* varieties as an irrigated *rabi* crop although the conditions favourable to the *chickpea* (irrigation, heavier soils, etc.) itself limits the overall potential of new additions. The resultant additions to the profits of the farmers will be Rs 28,000 per ha (irrigated) and Rs 19,000, approximately, per hectare (un-irrigated + heavier black soils).

#### IMPROVE YIELDS THROUGH THE APPLICATION OF BEST PACKAGE OF PRACTICES (POP)

India's average yields as of today are 42 per cent less than what they should be. The average productivity is languishing at 788 kg per ha. The best producers in the world have production levels close to 1,100 kg per ha, which can be easily achieved by concerted efforts at developing newer technology extension and adoption, combined with collective input procurement. The value that is lost in the absence of the above is to the tune of Rs 44 crores.

#### ENSURE ACCESS TO CREDIT

Farmers need to have access to easy credit so that they can invest in inputs such as good seeds, fertilizers, etc., to get better yields; this is a critical supporting enabler to the yield improvement recommendation. Farmer clubs and Self Help Groups (SHGs) need to be formed at village levels or cluster levels, and then financial institutions need to be motivated and directed to provide credit support to such groups.

There are two additional opportunities that

may be pursued over the medium/long term, as appropriate.

#### **BULK INPUT PURCHASE**

Smallholders need to come together and form farmers' collectives or SHGs for bulk purchases of inputs such as fertilizers, seeds and insecticides so that they can use the advantages of scale to get the benefits when procuring such items.

#### STORAGE

Building of warehouses to assure better and accessible storage facilities for smallholders can unleash a potential of up to Rs 3,000 crores in the chickpea sub-sector (Rs 6,000 per ha). This will bring about an increase in profits of about 25 per cent in the unirrigated variety and 55 per cent in the case of the irrigated variety for the farmer.

Finally, there are several opportunities, namely, milling, and sorting and grading, that should not be prioritized given their relatively low returns for farmers.

#### MILLING

Milling does not seem to be a very good option for small-holder collectives because the industry already has excess capacity and the margins appear to be quite low. It also requires significant investment (Rs 25 to 30 lakhs), as also inventory and risk management in which farmers may be at a disadvantage relative to other millers.

#### INTERVENTION AND RECOMMENDATIONS

Intervention in the chickpea value chain can create an estimated value for 10 million farmers, who depend on the chickpea as a key source of livelihood. A tailored set of interventions for each of the four priority segments of chickpea farmers is recommended.

#### SEGMENT A (IRRIGATED WHEAT DIET-BASED FAMILIES)

This segment of farmers can capture value by pursuing three priority interventions for three million farmers, based in Madhya Pradesh, Maharashtra, Andhra Pradesh and parts of Rajasthan. Unleashing the potential of this segment requires a basic investment, to Unleashing the potential of this segment requires a basic investment, to enhance wheat productivity; this will ensure that farmers meet their food security requirement in the most efficient manner possible so that they can dedicate a maximum portion of their remaining land to chickpea.

enhance wheat productivity; this will ensure that farmers meet their food security requirement in the most efficient manner possible so that they can dedicate a maximum portion of their remaining land to chickpea. Improving wheat productivity requires the introduction of a scientific POP, and easily accessible and non-exploiting sources of credit for carrying out farming. This will have its own benefits of impact on food security and impact on income (if any). For the land that these farmers are able to dedicate to chickpea, wherever possible farmers should be encouraged to shift to the kabuli varieties, which will create up to Rs 55,500 per ha of value. The key interventions to support this transition will include the availability of the pure 'dollar' seed, dissemination of an appropriate POP and easy access to credit for the required investment.

#### AVAILABILITY OF THE PURE 'DOLLAR' SEED

Farmers with sources of irrigation will be helped if they grow the *kabuli* variety with input benefits such as lower seed rates, less fertilizers and insecticides, and higher germination and productivity, with the desired output characteristics (seed of 100 seeds > 30g softer seeds, etc.). This helps farmers get at least Rs 10,000 additional value on their produce. DISSEMINATION OF AN APPROPRIATE POP

During this process of change from the *desi* to the *kabuli*, farmers need to be supported through some measure of handholding because the cultivation of the *kabuli* chickpea is more intensive than the *desi* counterpart. Exposure visits to a successful area and

meeting the farmers there are beneficial. Pilot projects will have to be taken up for early adopters and the successes of the first couple of years can then be spread across a larger geographical area.

#### ACCESS TO CREDIT

SHGs are needed for easy access to credit, so that the cultivators do not need to go to the local moneylender. Also, banks need to invest more into farmer groups and clubs with agriculture loans.

For those farmers who are unable to convert to the kabuli variety, there is still Rs 20,000 per ha of value that can be created by:

- Introducing effective extension services so that farmers are encouraged, motivated and handheld to adopt an improved PoP and enhance productivity to 18 to 20 quintals from the existing 10 to 12 quintals per ha.
- Providing accessible source of credit from banks and SHGs so that the farmers can take credit for investments that are required for adopting the PoP.
- Encouraging bulk purchase of inputs, to bring down costs for farmers and, similarly, bulk selling at least at the village level (if not at the cluster level), to ensure fairer returns.
- Finally, warehouses or storage houses at

the cluster level will need to be set up for the farmers to store their produce and take advantage of higher prices at a later time in the year. Investments need to be made for storage facilities at the cluster level, which will help them realize 15 per cent more farm gate prices. The produce can be housed or nested in farmers' cooperatives or collectives.

## SEGMENT C (UN-IRRIGATED WHEAT-BASED DIET)

For the six million cultivators falling in this category in India, in Madhya Pradesh, Rajasthan, Maharashtra, parts of Andhra Pradesh, and Uttar Pradesh, value can be captured by taking the following four high priority steps.

- Enhancing productivity by:
  - □ Introduction of appropriate varieties that have the desired output characteristics (shininess, lustre, shape) and enhanced wilt, blight, dry root, rot and drought resistance. This will help farmers realize an additional 24 per cent increase in yields for the unirrigated and 20 per cent for the irrigated.
  - □ Till such time that varietal improvements take place, introducing effective extension services so that the farmers are encouraged, motivated and handheld to adopt the improved PoP and enhance their productivity from 10 to 12 quintals per ha to at least 18 to 20 quintals per ha.
  - Providing accessible sources of credit in the form of SHGs/farmer clubs.
  - Facilitating easy agricultural loans through banks to farmer clubs and

SHGs, to enable this enhancement of productivity in the pulse sector.

- Encouraging bulk purchases of inputs, to bring down the costs for the farmers.
- Encouraging bulk selling, to help farmers realize fairer returns and also cut down on transportation costs.
- Finally, warehouses or storage houses will need to be set up at the cluster level as well for farmers to store their produce and take advantage of higher prices at a later time in the year. Investments in storage facilities for farmers at the cluster level will help farmers realize 15 more farm gate prices. Storage facilities can be housed or nested in farmers' cooperatives or collectives.

#### SEGMENT D (UN-IRRIGATED WHEAT-BASED DIET FAMILIES)

This segment of chickpea growers mainly depends upon paddy or maize and soybean during the *kharif* season and then goes in for a combination of un-irrigated wheat and chickpea. For the 0.8 million farmers residing in parts of Madhya Pradesh (Malwa region) and Maharashtra in this segment, the following five value interventions are a distinct possibility:

Unleashing the potential of this segment of small-holders requires a basic investment to first enhance their wheat productivity. The farmers have said that with dwindling landholdings, they would prefer wheat to chickpea or any such cash crop. This will ensure that more land is available for farmers after having secured food availability for their family. The land can then be invested in the chickpea crop, which is rain-fed but has a higher productivity due to better water retention properties.

□ Improving wheat productivity will

require the introduction and dissemination of scientific PoPs for wheat as well.

□ Easily accessible non-exploiting sources of credit for farmers.

This step of promoting enhanced wheat productivity will help farmers ensure food security.

- Enhancing productivity of chickpea:
  - Introducing effective extension services so that farmers are encouraged, motivated and handheld to adopt the improved PoP, which will enable them to enhance their productivity from 8 to 10 quintals per ha to at least 12 to 15 quintals per ha.
  - Providing easy and accessible sources of credit, in the form of SHGs, so that farmers can avail of credit for investments that are needed for ensuring the PoP.
  - Facilitating easier agricultural loans through banks to the groups (SHGs/farmers clubs/producer groups).
  - In the long term, seed research varietal development will also have to be taken up by institutes such as the Pulse Research Institute.
- Encouraging bulk purchases of inputs to bring down the costs for farmers.
- Encouraging bulk selling to help farmers realize fairer returns and also cut down on transportation costs.
- Finally, here too, warehouses or storage houses will have to be set up at the cluster level for farmers to store their produce and take advantage of higher prices at a later time in the year. Investments will have to be made for storage facilities for farmers at the cluster level, which will help them

realize 15 per cent more farm gate prices. The produce can be housed or nested in a farmers' cooperative or collective.

### SEGMENT F (UN-IRRIGATED NON-WHEAT DIET BASED FAMILIES)

This segment normally does not cultivate chickpea because they are mainly in paddy growing areas, where the chickpea is only an option in the lowlands that have higher moisture retention. These lowlands are occupied until December by paddy and by that time it is too late to sow chickpea. Also, there is the option for these families to earn their livelihood through wage labour and migration, which are more reliable than late chickpea cultivation; therefore, this segment is not appropriate for such an intervention. Even if there is an intervention, adoption will be low and sustainability under the face of such intense competition from wage labour will be doubtful.

In addition to the segment-wise recommendations, we also think that a sector-level investment in developing improved germ plasm varieties could create up to Rs 8,000 per ha (un-irrigated) and Rs 10,000 per ha (irrigated) of value for just Rs 280 per ha of investment.

#### IMPLICATIONS OF ANALYSIS FOR AREAS UNDER THE RIUP

The population dealt with by the RIUP project is mainly in the segments C and F. Both these segments comprise farmers with un-irrigated land and with mainly lighter soils. We interacted with the farmers and the experts in this area and had the following observations:

 The productivity of the *kabuli* variety being used there (ICCV2 and KAK2) are very low (1.25 to 3.75 quintals per ha versus the potential of 20 quintals per ha).

- Experts confirmed that the *kabuli* variety should be irrigated and/or grown on heavier (black) soils, to achieve its maximum potential.
- Farmers have been unable to sell their produce due to low local market acceptance. Local organizations have aggregated substantial quantities of the *kabuli* chickpea produce and have been unable to sell it for the past two years; when the kabuli chickpea is sold, its rates are low, yielding only Rs 1,800– 2,000 per quintal compared to Rs 2,000–2,200 per quintal for the *desi* variety.

Based on our analysis, the *kabuli* variety without irrigation is not a competitive source of livelihood and food security. So, we would suggest the following modifications to the programme:

- Discontinue un-irrigated *kabuli* chickpea because it will not be a sustainable source of livelihood or food security.
- Shift the focus to promote the *desi* chickpea cultivation among farmers in segment C, which has better droughtand wilt-tolerant varieties; this will at least enable the farmers to meet their food security needs and can also contribute to their cash income.
- Implementation of the earlier segment C recommendations should result in improved yields of X per cent per acre, which would correlate to income improvements of Rs Y per hectare, if the farmers sold their produce.
- Activities with segment F should be discontinued, as per earlier recommendations, and the focus should shift to other relevant and more remunerative options.