



Institutionalising COVID Period Innovations in Agricultural Marketing



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Contents

Sl. No.	Articles	Page No.
1.	Innovations and Good Practices for Marketing of Fruits and Vegetables during COVID19 <i>T.M. Gajanana</i>	1-9
2.	Good practices in Agricultural Wholesale Markets: Answer to COVID19 Challenges <i>Anil Chauhan</i>	11-18
3.	Unconventional Strategies for reaching Customers during Lockdown Period <i>V K. Jayaraghavendra Rao</i>	19-23
4.	Use of ICT in Agricultural Marketing <i>P. Murali and D. Puthira Prathap</i>	25-36
5.	Maize: Crop And Post-Harvest Management During COVID19 Situation <i>M. C.Dagla, Pardeep Kumar, Bharat Bhushan, Ramesh Kumar and S. B. Singh</i>	37-46
6.	Do's and Don'ts for the farmers in COVID period <i>Roshan Lal Meena</i>	47-59
7.	Linking Farmers to Market : Marketing of Perishable Commodities during lockdown period <i>B. S. Reddy and G.M.Hiremath</i>	61-70
8.	Fisheries Marketing in COVID Period: Innovations & Good Practices <i>B. Ganesh Kumar</i>	71-75
9.	Government Programmes for welfare of farming community during COVID19 <i>Ashok Kumar</i>	77-86
10.	Direct Marketing in Agriculture: Emerging innovations in COVID Period for Fruits and Vegetables <i>H.M. Hiremath and B. S. Reddy</i>	87-96
11.	Green Fodder Conservation and Marketing as Enriched Animal Diet in the Lock Down Period of COVID19 <i>Prabha Kant Pathak, Prakash Narayan Dwivedi, Sanjay Kumar Singh, Chandra Shekhar Sahay, Amit Kumar Patil and Bholuram Gurjar</i>	97-104
12.	Crop Management and Hybrid Seed Production Activities in Rabi Maize : Harvest to Marketing during COVID19 Lockdown <i>Shyam Bir Singh</i>	105-117

Crop Management and Hybrid Seed Production Activities in Rabi Maize: Harvest to Marketing during COVID19 Lockdown

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Introduction

Maize (*Zea mays* L.) is one of the most versatile crops with its highest genetic yield potential among the cereals. It has diverse uses and can be grown with elevation ranging from sea level to up to 3000 amsl from Kashmir to Kanyakumari. More than 1000 products are made in India using maize. Maize is good source of carbohydrates, protein, fat, vitamins and minerals. Major share of maize grain is utilised in poultry feed (47%) followed by industrial use (14%), direct food (13%), livestock feed (13%), processed food (7%) and export (6%) (Fig 1).

The current situations of lockdown in the country due to COVID19 pandemic restricted the movement of human force in day to day activities. The major impact of COVID19 lockdown on rabi maize field operations in grain crop and seed production crop like harvesting, drying, shelling grading, packing due to non-availability of labour, machinery, other inputs, and reduced market price were reviewed to provide possible management solutions on these operations and storage of maize produce.

Majority of maize crop is cultivated during kharif season and nearly 80% kharif crop under rainfed environment. During Rabi, maize is popular in Bihar, Orissa and southern states like Andhra Pradesh, Telangana, Karnataka etc. Rabi maize grain is highly valued by industry for the grain quality due to proper grain filling and bold grain size. As per the second advance estimate during rabi season 1554 thousand ha will be under maize cultivation (Table 1). Expected production is 8219 thousand tons. In maize area, Bihar tops with 278 thousand ha representing 18% of rabi maize area, closely followed by West Bengal with 211 thousand ha (14%) and Maharashtra with 198 thousand ha (13%). Other important rabi maize growing states are Andhra Pradesh (183 thousand ha), Tamil Nadu (181 thousand ha), Telangana (163 thousand ha), Gujarat (129 thousand ha), Karnataka (87 thousand ha), Uttar Pradesh (59 thousand ha) and others (Rajasthan, Madhya Pradesh, Jharkhand, Odisha etc.). Among the main rabi maize growing states, Andhra Pradesh is having highest

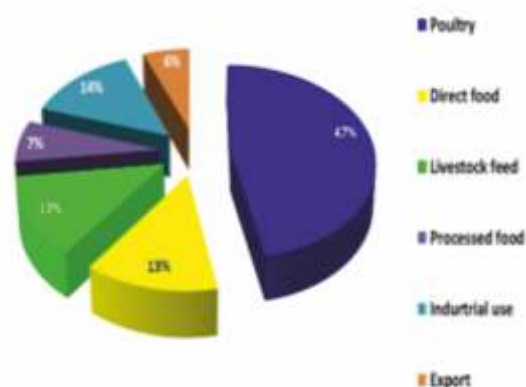


Fig. 1 Maize utilization pattern in India

productivity (7678 kg/ha) followed by Tamil Nadu (5468 kg/ha), Telangana (5383 kg/ha) and West Bengal (5158 kg/ha) (Table 1). The state of Andhra Pradesh and Telangana are the most important source of hybrid seeds, which is produced mainly during rabi season. In recent past West Bengal is also coming up as an important hybrid seed producing hub in the region (ICAR-IIMR COVID19 advisory for farmers, 2020).

Pradesh is having highest productivity (7678 kg/ha) followed by Tamil Nadu (5468 kg/ha), Telangana (5383 kg/ha) and West Bengal (5158 kg/ha) (Table 1). The state of Andhra Pradesh and Telangana are the most important source of hybrid seeds, which is produced mainly during rabi season. In recent past West Bengal is also coming up as an important hybrid seed producing hub in the region (ICAR-IIMR COVID19 advisory for farmers, 2020).

Table 1 Rabi Maize area (000 ha), average yield and stage of crop during current lockdown in third week of April in various states

State	Area	% of rabi maize area	Average state yield (kg/ha) *	Current growth stage
Bihar	278.4	17.9	3945	Grain filling
West Bengal	210.6	13.6	5158	Grain filling
Maharashtra	198.3	12.8	2332	Near harvesting
Andhra Pradesh	183.0	11.8	7678	Harvesting
Tamilnadu	180.7	11.6	5468	Harvesting
Telangana	163.0	10.5	5383	Harvesting
Gujarat	129.4	8.3	2007	Harvesting
Karnataka	87.4	5.6	3147	Near harvesting
Uttar Pradesh	59.0	3.8	4342	Grain filling
Others	64.6	4.2	2281	Grain filling/harvesting
All-India	1554.4	100.0	4160	

Source: Second advance estimate of Rabi Maize and current growth stage during 2019-20.

Impact of COVID19 lockdown on Rabi Maize and seed production crop

COVID19 emerged as a new pandemic to the entire world expecting one of the most devastating threats to human life. Due to preventive measure, government of India announced complete lockdown in the country *w.e.f.* 25th March, 2020. Initially it is imposed for three weeks but extended third time up to 17th May, 2020. During this April and May, the maize crop is in different stages. Maize being highly adaptive crop, its sowing varies from state to state. During mid-April to end of April in Southern India maize is near to harvesting, where particularly in seed production area harvesting has been stated in mid-April. On the other hand, in eastern India the crop is in grain filling stage. In Peninsular India, where the crop is in harvesting stage the lockdown will affect harvesting, drying and shelling operation partly. The seed production, processing, packing and transportation will be affected. However, since mostly the harvesting and processing operations are mechanized in nature the operations can be completed quickly. It may be noted that in many cases the seed production

and processing plants are physically separated, some cases in two states (Andhra Pradesh and Telangana). Interstate movement of seeds should not be hampered due to lockdown. Interstate movement of combined harvesters are allowed, which eases out the operation. However, since the drivers/operators of combined harvesters or seed transporting vehicles move from one state to another there will be apprehension of spread of COVID19. Where in Peninsular India maize has been cultivated as grain crop farmers are expected to face problem of drying, shelling and subsequent sale. Following are some major problems emerged due to COVID19 lockdown to manage rabi maize crop:

- Non-availability of labors for harvesting, shelling, and drying in commercial maize crop.
- Non-availability of labors for harvesting, shelling, drying cleaning, processing grading, packing *etc.*
- Non availability of combine harvesters, sheller cum dehusker, dryers to perform harvest and post-harvest operations in absence on no availability of labors.
- Restrictions on free movement of labor.
- Problem in shelling, drying and marketing due to intermittent unexpected rains if persists during May also.
- Non availability of market facility near to every maize growers/villages.
- Non availability of easy transport Transportation for carrying of maize produce to market.
- Fear among farmers not to get MSP of farmers may be forced to distress sale.
- Non-availability of sufficient storage.

Objectives of the problem

The objective of this presentation was to provide advisories to rabi maize farmers for best management of field activities during lockdown period. To deal with the problem of non-availability of labours through the use of machineries and options of mechanization available. To provide information about government initiatives for marketing of their harvested produce and also to provide storage information in case farmers want to retain their produce to avoid period of low-price market.

Strategies for augmenting COVID19 crises

Advisories/Precautions for management of Rabi Maize crop during lockdown period

Maize farmers cannot sustain without proper management of their maize crop and leaving field operations aside. Dealing efficiently with the present lockdown situation is a great challenge against the rabi maize farmers. To help farmers under this situation ICAR-Indian Institute of Maize Research, Ludhiana has issued advisories for rabi maize growers/farmers of the country. They may be grouped in two categories.

Precautions to be followed at individual farmer/labor level

- Before start harvesting operation, ensure sanitation measures like mask, sanitization of all tools/implements/machinery if these were previously used by another person.
- Start harvesting at 100% drying of husk covers and also maximum drying of stalk which result in requirement of less time and labor for cob drying.
- Do harvesting operation by maintaining required distance (minimum 3meter) from other field worker/labor.
- Try not to share your belongings/ minor tools like sickle/spades/Gamchha/drinkable and eatables without proper sanitation.
- Do not use unknown labors came from surrounding/ other districts.
- Engage only well-known local persons as labor without illness or with no symptoms like fever, nausea, cough and cold.
- Avoid working in very hot times like 11:30 AM to 3 PM.
- All farmers are also being advised not to use any smoking means/fire igniting tools nearby matured maize field which are under harvest or ready to harvest to avoid any fire instances.

Precautions to be followed by Drivers/operators of machines/combindes/Seed firms

- Mandatory quarantine of 14 days for farmers of technical/ mechanic engaged in agriculture operations cannot be afforded. Under this situation such drivers/operators of harvester/combine/dryer/ dehusker/sheller/processing machines may be allowed to work in isolation to undertake harvesting/processing operations.
- These machines with skeletal staff in batches, maintaining physical distance and proper sanitary measures.
- When seed processing and packeting are done, the seed packets may properly be fumigated before transport.
- Seed companies may be advised to ensure proper fumigation/disinfection of their machines and workers who will handle the seed packet seed godowns.
- These need to be percolated up to dealer level so that the seeds and seed packets do not become source of infection to farmers.

Initiatives to be taken by the state government

- This time north and eastern India is facing frequent untimely rain. Eastern India quite often experience untimely hail storm from April onwards, which affect standing maize crop or the harvest. Therefore, to sustain the maize crop and maize farmers following initiatives may be taken by state governments:
- Immediate measures need to be initiated to ensure crop insurance, wherever the crop is approaching grain filling or at harvesting.
- Use of combined harvesters need to be encouraged for quick harvesting of the crop to avoid harvesting like group activity.

- Facilities for community drying and shelling may be encouraged. Such dryers and shellers may be subsidized.
- Maize marketing is totally unorganized, in which the middle men and representative of feed/starch factories purchase grains from farm gate.
- Since farmers will face problem of labor in taking up post-harvest processing, they may be forced to go for distress sale. Government needs to intervene to ensure that maize grains are procured through mandies on MSP.
- Storage facility of maize may be ensured at taluka level to reduce chances of distress sale.

Use of machineries in harvesting/post harvest operations to combat shortage of labours

In India nearly 98% farmers in eastern India perform harvesting operation manually. Now machines are available to substitute the labour or reduce the requirement of labour in post-harvest operations. Dehusker cum sheller is available in which fresh harvested ears with husk cover can be put for direct shelling. There is no need to remove husk. These machines have big capacity and easily movable from one field to another as these are powered and driven by tractor. Harvested maize has high moisture content ranging 20-30%. The high moisture content in grain reduce the self or storage life of the grain and also enhanced chances of aflatoxin development. Therefore, drying in maize is very much essential to bring down the moisture content to 13% on which it can be stored. Farmers are generally practice sun drying requiring 3-5 days. But sometimes sun drying becomes difficult due to cloudy weather or intermittent rains. Under these circumstances seed dryers are the best solutions. However, these machines are not easily available in most of the area's government may take initiatives to make availability of seed dryers at panchayat or village level. Combines are very popular in maize harvesting in Punjab Haryana UP and in some areas of Bihar. Some maize farmers in Punjab also use maize combines for maize harvesting. Like wheat harvesting maize combines are perform all operations like harvesting, shelling. Farmers have no need to do harvesting and shelling operations separately. But due to high cost of the maize combines every farmers of marginal and medium farmers cannot afford maize combines. Therefore, government may provide maize combines in the maize cultivation areas on custom hiring basis.

Government initiatives for Maize marketing

Due to lockdown marketing of farmer produce become a problem to farmers. As transportation of all means were restricted but later Government has permitted all agricultural produce for transportation. Many initiatives were taken by the state governments for help of farmers. Major maize produce goes into the poultry feed industry and due to lockdown demand of poultry declined to great extent thereby decreasing demand of poultry feeds resulting less demand of maize by the poultry industries. Due to sharp decline of market rates farmers are not getting MSP even maize price in Gulab Bagh mandi in Purnea in second week of April was approximately ₹1234/ qtl against last year price of ₹1775/ qtl during same period. To safeguard the interest of farmers government has provided marketing platform for farmers like eNAM.

National Agriculture Market (eNAM) is a pan-India electronic trading portal which networks the existing APMC Mandies to create a unified national market for agricultural commodities. Small Farmers Agribusiness Consortium (SFAC) is the lead agency for implementing eNAM under the aegis of Ministry of Agriculture and Farmers' Welfare, Government of India (Anonymous 2020b). Farmer can sale their produce through eNAM portal. First, they have to register on eNAM portal through mobile and email. He will get user ID and password on successful registration. He can select APMC to sale their produce. eNAM is very helpful to farmer for marketing of their produce. Recently, on 11th May, 2020 government has added 177 new mandies on eNAM portal out of these, 26 are from Haryana, 17 are from Gujarat, one from J&K, 54 from Maharashtra, 5 from Kerala, 13 from Tamil Nadu, 15 from Odisha, 25 from Rajasthan, 17 from Punjab and one from West Bengal. Earlier Hon'ble Union Agriculture Minister Sh. Narendra Singh to mar on May 1 had launched the integration of 200 eNAM mandies from seven states, in which Karnataka was also added on eNAM to help the farmers. 785 Mandies were earlier integrated with eNAM across 17 states and 2 UTs along with a user base of 1.66 crore farmers, 71,911 commission agents, and 1.30 lakh traders. Now total 965 mandies of 18 states and three union territories are integrated on eNAM portal for wide coverage and to bring large farmers on this portal (Anonymous 2020b).

In other initiatives as an example in Andhra Pradesh over 700 new decentralised procurement centres has been set up in to support farmers amid lockdown. The state government has come up with an innovative and decentralised procurement plan to support farmers in the state during the lockdown period. These centres, set up near farmlands, are aimed to assist the government in eliminating the chances of distress selling and farmers to travel shorter distances from their farms which, in turn, will help authorities to execute the lockdown and social distancing norms.

Amid lockdown, the Andhra Pradesh government has introduced a farm gate system to procure agricultural produce directly from the doorstep of farmers at the village level. To start with, the government will be procuring paddy by agriculture assistants at the village secretariats. This system will help farmers not to carry their produce to the procurement centres and will also end the role of middlemen to a large extent (Anonymous 2020c). Telangana Government also set procurement enters in villages. Since the market yards in towns are shut, the government has opened 7,000 centres in villages to procure paddy directly from farmers. The procurement will continue till May 20 by following social distancing guidelines and other precautions. Every farmer would be issued a coupon, mentioning the date on which he will have to bring his produce to the procurement centres. After the procurement, the money will be transferred online into the farmer's bank account. The paddy cultivation was taken up on 40 lakh acres, which is a record. The government has set aside 30,000 crore to procure about 1.05 crore tonne of paddy and another 14.5 lakh tonne of maize from farmers (Anonymous 2020d).

Management at post harvest stages for Maize:

In absence of good price or MSP maize farmers can store their harvested maize grain till availability of handsome price. Postharvest handling is an important segment in the maize

value chain to minimize postharvest losses and subsequently increase farmers' income level. Postharvest involves a number of stages, which include, field drying on stalk, harvesting and stocking, transport from field, temporary storage, drying, dehusking, shelling and cleaning, storage and marketing. During postharvest, significant quality and quantitative losses occur if not handled with care. During harvesting, if incompletely matured maize is harvested, then it causes shrinkage leading to reduction in weight and quality of maize kernels, drying maize on ground greatly reduces the quality of maize through contamination and mixture with soil & other foreign matter. After drying, poor storage is another stage where maize quality and quantity losses are common if not stored properly, this comes as a result of storing maize of moisture content above 13% that cause development of fungi (mould) and also provide congenial environment for insect pest attack. Storing on bare ground and keeping storage equipment in close touch with walls allow exchange of moisture between stored maize and walls or ground. Only dry maize from the field when most of the plants have drooped should be harvested. Maize farmers should use tarpaulins where the maize is to be dried to avoid spillages and contamination with foreign matter and soils. Before storage, farmers must check the moisture content of the grain by using bottle and salt. Arrange a dry glass bottle with a cap, dry salt, a dry teaspoon, a dry plate, and grain. Grain is to be filled 1/3 of the bottle and two teaspoons of salt is added and bottle is closed tightly. Shake the bottle for one minute and let it to settle for 15 minutes. After 15 minutes, if salt sticks on the inside of the bottle then the grain moisture content is above 13% and is not ready for storage. But if the salt does not stick to inside of the bottle then the moisture content is below 13% and that would mean the grain is ready for storage (Anonymous, 2020e).

Since, due to complete lockdown in the whole country due to COVID19 and unavailability of proper market, middle men has become active and purchasing the farmers produce at very low price. In this lockdown period, maize has been harvested and farmers are struggling to get the good price. Since, poultry sector is the major consumer and accounts for around 47% of the maize produced in the country. The slump in poultry sector due to lockdown & low preference of non veg by the people is one among the major reasons for lowering the demand of the maize. So, if farmers store their grain for one or two months, then they can get the good price after the resumption of normal situation. So, it is better choice to store the maize produce for some time which can result in fetching the good price to the ultimate stakeholders.

Management of Maize Storage

In absence of good price or MSP maize farmers can store their harvested maize grain till availability of handsome price. Postharvest handling is an important segment in the maize value chain to minimize postharvest losses and subsequently increase farmers' income level. Grain storage is the major factor in deciding the entire grain marketing strategy as the market value of grain remains lowest at harvest. It makes sense for producers to store production until prices rise later in the year. Farmers are often left with no any other alternative but to go for

distress sell their produce just after harvest, even at very attractive prices which does not fulfil their cost of production. Integrated food protection measures during storage enables farmers to extend the storage period without having to take the risk of increased losses. As a result, farmers with surpluses have greater choice in selecting the appropriate date of sale, which means they can wait for periods where maize prices have reached a high level. The integrated stored-food protection has the particular advantage of using materials which are available everywhere, and of being based essentially on traditional practices. As a result, the costs are unusually low, and a high level of acceptance among farmers can be anticipated. Proper Storage of the maize produce leads to:

- Protect against rapid spoilage due to mould growth.
- Enhance self-life.
- Avoid postharvest grain losses caused by insect pests
- Most effectively market the grain.
- Avoid the distress sell.
- Get the good & genuine price.

If the farmers are intended to store the grains for long term, then they should focus on the few major points to minimize the losses during the storage:

- **Fumigated bins:** Farmers must fumigate the bins before keeping the fresh grain in the bins. Walls and floor of the bins/storage area should be painted/ white washed or sprayed with solution of deltamethrin 2.8EC@1.5ml/l of water.
- **Store quality grain (free of moulds & insect pests):** The grain to be stored must be well dried and free from the moulds & insect pests as a minute inoculum of the insect pests in the storage bin can ruin the whole grain in due course of time of storage.
- **Dry to the right moisture content:** Maize should be dried well before storage below 13 % moisture content. If the maize is not dried sufficiently, it can easily become mouldy. Drying at temperatures above 60°C causes the kernels to crack and leads to an increased risk of infestation by secondary pests. Generally, Seed can already lose its viability at a temperature of 43°C. So, sun drying is the cheap and best option to dry it. However, seed drier can also be used to dry it properly.
- **Improved aeration of bins:** Aeration of the bins time to time reduces the humidity inside the bin which reduces the chances of any insect pest infestation.
- **Control temperature:** The place, where bins are to be kept should be in the shaded area so that grain inside the bins not get exposed to the very high temperature as the temperature over 43°C not only reduces the viability of the seed (if seed is stored) but also large temperature fluctuation enhances the chances of loss of grain quality.

- **Check grain frequently:** Grain must be checked frequently for any type of insect pest infestations. If any infestation is seen, then it must be sun dried again & then after applying the insecticide, it should be stored.

Management strategies for storage pests (Lakshmi Soujanya *et al.*, 2019):

- Cleanliness and sanitation: Dusts, grain, and chaffs should be removed from transport system, storage area as well as threshing yard before using them for new produce after harvest.
- Crop should be harvested at the proper time to prevent egg laying by storage pests.
- The moisture content of grain should be less than 13%.
- Newer grains should not be mixed with older ones.
- Seed stored bags should be kept few inches above the ground.
- Walls and floor of the storage area should be painted/ white washed or sprayed with solution of deltamethrin 2.8EC@1.5ml/l of water/100sqm.
- Maize should not be kept on the cob for more than two months as this will lead to heavy insect infestation and losses.
- After 6–8 weeks, maize can be shelled, treated with insecticide & placed in bags and put back in the crib.
- Malathion 50 EC @ 15ml / 4.5 litres of water or 5% NSKE should be sprayed as a thin film on bags before use.
- Staggered sun drying with short exposure to sun spread reduces insect infestation.
- Lime dust distributed evenly in a fine coat over the stored products have Dehydrating effect on insects, blocks their respiratory orifices.
- By modified atmospheric storage, insects can be controlled by decreasing O₂ or increasing Co₂ or N₂.
- Use of plant products such as *Adathoda vasica*, *Azadirachta indica*, *Vitex negundo*, *Catharanthus roseus* @ 2% w/w (20g /kg seed) have been found to be effective against storage pests.
- Storing of maize in double layered bags is advisable. Application of leaf powder of *Tinospora cordifolia* as water-based paste between the layers of double layered storage bags provide protection against *Sitophilus Oryza* for a period of five months (LakshmiSoujanya *etal.*2018).
- Hermetic control (complete air tightness) is a simple, cheap and effective method of insect management. In this method metabolic activities of insects and microflora act as bio generators that alter the oxygen and carbon dioxide composition of the intergranular atmosphere so that insect development is arrested.
- Right execution of pre-storage activities will help farmers by reducing the risk of insect pest infestation from field to storage. Preventative measures such as right time of

harvest, maintaining optimum moisture content, sanitation in storage area, proper storage structures are essential for effective protection of maize under storage conditions. Utilization of botanicals alone and in combination with different packaging materials reduce rice weevil infestation and its associated losses. Also, application of botanicals through novel methods protects the stored grain without any adverse effects. Implementation of preventative measures and appropriate use of botanicals in hermetic storage help in strengthening food security and higher returns to small scalefarmers.

Storage methods:

The storage methods range from mud structures to modern bins. The containers are made from a variety of locally available materials differing in design, shape, size and functions. The materials used include paddy straw, wheat straw, wood, bamboo, reeds, mud, bricks, cow dung etc. Grains can be stored indoors, outdoor or at underground level. Outdoor storage of grains is done in structures made of bamboo or straw mixed with mud. For safe and scientific storage, it is important to carefully select the storage site, storage structure, undertake cleaning and fumigation, ensure proper aeration of grains followed by regular inspection of grain stock. There are many traditional methods of storage which has been depicted below through photographs.

Traditional methods:

Maize cobs, are sometimes tied in bundles, which are then suspended from tree branches, posts, or tight lines, on or inside the house. This method can only be provisional since the grain is exposed to all pests, including domestic animals, and the weather. A platform consists essentially of a number of relatively straight poles laid horizontally on a series of upright posts. If the platform is constructed inside a building, it may be raised just 35-40 cm above ground level to facilitate cleaning and inspection. Platforms in the open may be raised at least 1 metre above ground level. They are usually rectangular in shape, but circular or polygonal platforms are common. Grain is stored on platforms in heaps, in woven baskets or in bags (Fig. 2).

Fig. 2. Traditional methods



Brick bin storage: This type of storage is made up with the bricks on which roof tops are either made up of thatches or of RCC. The grain is kept along with the wheat straw which prevent the attack of rats as well as insect pests. These storage structures are very strong and therefore, the effect of season on them is negligible. The bin is made on a platform raised at 60 cm above the ground. A hole of about 60 cm diameter is provided on the roof for the purpose of loading the

material i.e. grains. The walls of bin are cement plastered on both the sides. The base of bin is made inclined and an outlet is provided for unloading of grains. The capacity of such bin is usually between 1.5 to 60 tonnes (Fig. 3).

Fig. 3. Brick bin storage



Ferrocement bin: The ferrocement bins are cylindrical in shape and are assembled using prefabricated components, viz, base slab, wall unit, dome shaped roofs unit and lid (Fig. 4). Bins of various capacities may be assembled by erecting one, two or three wall units, one over the other and filling up the joints. A manhole is provided in the roof unit for loading and an outlet is provided in the bottom wall unit for unloading the grain. Caskets are provided on the inlet and outlet openings to make the bins air-tight. Locking arrangements are also provided. The foundation of this bin is ideally made up of stones. It is built using chicken-wire reinforcement and cement mortar. A wooden frame built of light, straight tree branches or used wooden strips forms the shape and holds the chicken wire in place and cement mortar applied from outside. Top opening is made wide enough for a man to enter and covered with either a cone-shaped lid or chicken-wire reinforcement plastered with cement mortar lid. It is cheaper compared to steel, reinforced Concrete, aluminium and plastic bins. It also requires little or no maintenance and the condensation and moisture migration problems in the grains stored in Ferrocement bins are much less than in food grain stored in steel bins. Ferrocement bins are rodent proof, fire proof, damp proof and can be easily made air-tight by sealing the inlet and outlet openings.



Fig 4. Ferrocement Bin

Steel Bins: It is the most commonly used bin now a days which comes ready to be used and there is very less chances of insect pest infestation if it has been used after proper fumigation. The condensation and moisture migration problems in the grains stored in steel bins are higher than in food grain stored in ferrocement bins. Maintenance on steel bins is minimal, ensuring they are cleaned when emptied and inspected for insects, corrosion, loose bolts, foundation cracks and poor seals.

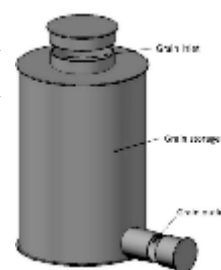


Fig. 5. Steel bins

Bulk Silo storage

Technological advancement is now playing a vital role in stimulating growth with vertical scientific storage structures gradually replacing the traditional horizontal flat-bed warehouses for agricultural storage. NCML has constructed modern Silo complex of 36000 MTs capacity

duly equipped with facilities like Dryer and Chiller for safe and efficient preservation of Maize at Purnea, Bihar. In this structure, the grains in bulk are unloaded on the conveyor belts and, through mechanical operations, are carried to the storage structure. Silo is a vertical tank like structure made of steel for bulk storage of food grains in controlled atmosphere. Silos offer several advantages depending upon their layout and automation. Silos require 1/3rd of the land as compared to conventional warehouses. The storage of grain in a silo is possible for long periods without quality loss or damage through various biotic and abiotic factors. If food grains are stored in silos and transported in bulk, losses due to theft, pilferage and transportation would be negligible compared to food grains storage in bags in conventional warehouses. Because of mechanisation, silos require less labour in operations, handling is rapid and the overall operating cost low. Being a closed structure, preservation of maize in a silo through chilling technique can be carried out more easily, efficiently and effectively. Lately Chilling technique is gradually becoming more popular method of grain preservation in sub-tropical countries like India over traditional method of grain preservation which essentially include periodic aeration coupled with fumigation as it is not only cost effective but is more safe, easier and efficient way of grain preservation. Further, it also supports storage of Maize in bulk storage with grain moisture up to 14.5% as against the requirement of 12% (required when stored in bulk). Silos having Drier facility can effectively address the issue of handling large volumes of high moisture grain received from the farm gate during the harvest period which usual extends up to a period of 45-60 days (FICCI report, 2018).

Conclusions

Impact of COVID19 lockdown on rabi maize crop harvesting and post harvesting operations was analysed in the webinar. All maize rabi maize farmers, drivers, mechanics/operators were advised to work with following COVID19 isolation guidelines. Advisories regarding harvesting and post harvesting operations like shelling, drying, of commercial grain crop and processing, grading packing storage of grain as well as seed produced were given. Emphasis was given on the use of modern technologies and mechanizations like seed dryers, maize harvester and modern bulk silo storage in absence of labours and due to unpredicted climatic situations like unexpected rains at harvest. Problem of maize marketing was discussed advising farmers to use eNAM portal for marketing. Examples of Andhra Pradesh and Telangana for direct procurement of maize and other crops on MSP needs to replicated in other states aimed to eliminating the chances of distress selling, avoid farmers long distance travel, to safeguards the interest of maize farmers and ensure good returns to them.

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