14

NEED FOR SCIENTIFIC WAREHOUSES

In the previous lesson, you learned about the Warehouse viz., meaning, definition, and objectives. In this lesson, we shall discuss the Need for scientific warehouses. Warehousing plays a very important role in the demand and supply of various goods. It is a key component of the commodity supply chain which consists of the facilities and systems which add value to the products by providing efficient storage and distribution. Warehousing plays a prominent role in facilitating trade, distribution of goods across different segments, and improving economic development. The overall objective of grain storage is to preserve the quality which is influenced by various abiotic and biotic factors.

LEARNING OUTCOMES

After studying this lesson the learner:

- identifies basis of setting warehouses and functions associated with warehousing;
- lists the role of scientific warehouses in storage of various commodities;
- acknowledges biotic and abiotic factors associated with grain storage;
- organizes the stored grain pests.

14.1 WHY WE NEED WAREHOUSING

We must not forget the immense role played by warehousing in the demand and supply of various goods (Fig 14.1) as discussed below:

A. Seasonal Production: We are aware that the agricultural commodities are harvested in certain seasons but the consumption or use takes place throughout the year. In

order to ensure uninterrupted supply, it is very much essential to preserve the commodities till the next crop.

B. Seasonal Demand: There are certain goods like fertilizers, pesticides and other agrochemicals, which have a seasonal demand based on type of crop, but are produced round the year in a production unit. It calls for the need to store these goods properly so as to make them available at the time of need.

C. Continuous Production: The industrial production in factories is a continuous process seeking adequate supply of raw materials. Warehouses are therefore required to store different types of raw material to meet demand of industries.

D. Timely Supply: Both industrial as well as agricultural goods are produced at some specific places but consumed throughout the country. It is therefore necessary to stock these goods near the place of consumption and arrange quick transport whenever required.

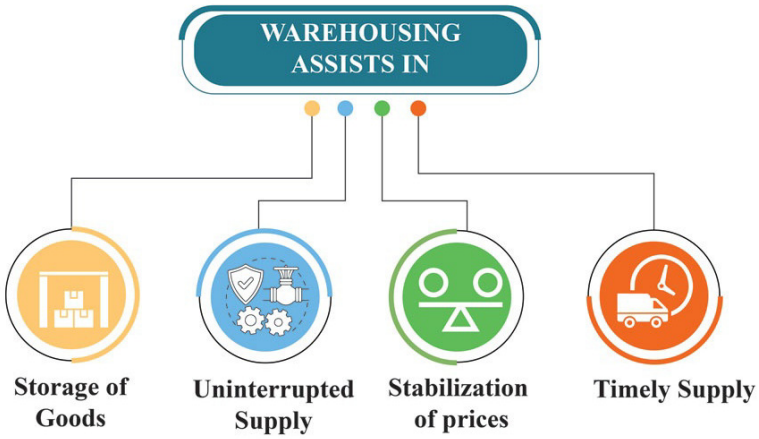


***Fig 14.1*: Role of warehousing**

D. Stabilisation of prices: Fluctuation in prices of goods takes place because of inefficient management of supplies as per demand. It is therefore important to keep a balance in the supply of goods vis-a-vis demand to maintain a reasonable level of price of goods in the market, which can be achieved through efficient warehousing practices.

14.2 FUNCTIONS OF WAREHOUSING

Warehousing, a key component of the commodity supply chain, consists of the facilities and systems which add value to the products by providing an efficient storage and distribution to them from the production areas to the consumers. The requirement of warehousing starts at the point of production or procurement of raw materials and ends at a point when it reaches the door of customers.

Need for Scientific Warehouse

The Basic function of a warehouse is to preserve goods on a large-scale in a systematic manner. It provides protection to goods against fire, flood, cyclone, storm, heat, moisture, etc. and also cuts down losses due to damages. In addition to this, warehouses nowadays also perform a variety of other functions like grading and assaying, transportation, etc. The various functions discussed in this section help in integrating the role of warehousing as a tool of economic development. Some of the common functions performed by warehouses are listed below:

A. **Storage of Surpluses –** Warehouse acts as a place for storage to make available seasonal products all-round the year.

B. **Protection of goods –** The standard operating procedure of the warehouses provides for taking all the precautions for protecting the goods from various factors responsible for losses and damages during storage.

C. **Risk bearing –** Being a bailee of goods as per the law like the Indian Contracts Act, the warehouses have an obligation to take over the risks incidental to the storage of goods and are responsible to return the goods in good condition.

D. **Cleaning and Grading –** On request of the depositors, the warehouses can also provide cleaning and grading services to improve the quality of the goods. Since the quality is mentioned in the Negotiable Warehouse Receipts (NWRs), the depositors get a better price in the market or a higher value of the loan from banks against the pledge of NWRs. Warehouses do provide ancillary services like blending and packaging of goods for the benefit of their customers.

E. **Consolidation –** Warehouses help in consolidation of small quantities from a large number of farmers to create desired size of lot as per the shipment/trade requirement. The savings in outbound shipping costs based on economies of scale outweigh the small expenditure on warehousing costs.

F. **Product mixing –** A manufacturer producing different products at different locations may avail the services of a warehouse to create different product mixes as per the need of his suppliers/consumers.

G. **Processing –** Sometimes warehouses also undertake the processing of raw material on behalf of the owners.

H. **Traceability –** In order to track the movement of goods stored in warehouse technologies like Bar-coding or RFID (Radio Frequency Identification Devices) tagging, etc. are used in modern warehouses. While a Bar code may contain key information about the goods deposited, RFID tagging is a system which is capable

of holding large amounts of information about the product and its further movements.

I. **Financing –** A depositor gets a warehouse receipt for depositing goods in a warehouse. The receipt acts as proof of the deposit of goods. The warehouses can also issue a Negotiable Warehouse Receipt (NWR) in favour of the owner of the goods. So, while the goods are in the custody of the warehouse operator, the depositor can obtain pledge loans from banks and other financial institutions by keeping this NWR as security. Heavy and bulky goods can be loaded and unloaded by using modern machines leading to reduced cost of handling, besides lesser wastages in handling operations.

J. **Transportation –** In some cases, warehouses do provide transport arrangements to the bulk depositors at their request, by picking up their goods from the production point and delivering the same to the place of delivery.

K. **Distribution –** A warehouse may also take the responsibility of moving smaller quantities of a finished product to the market which was deposited in bulk quantity.

L. **Reverse Logistics –** The process of moving goods in reverse order from their final destination. If the product is defective, reverse logistics facilitate the process of collecting the defective products from the customer.

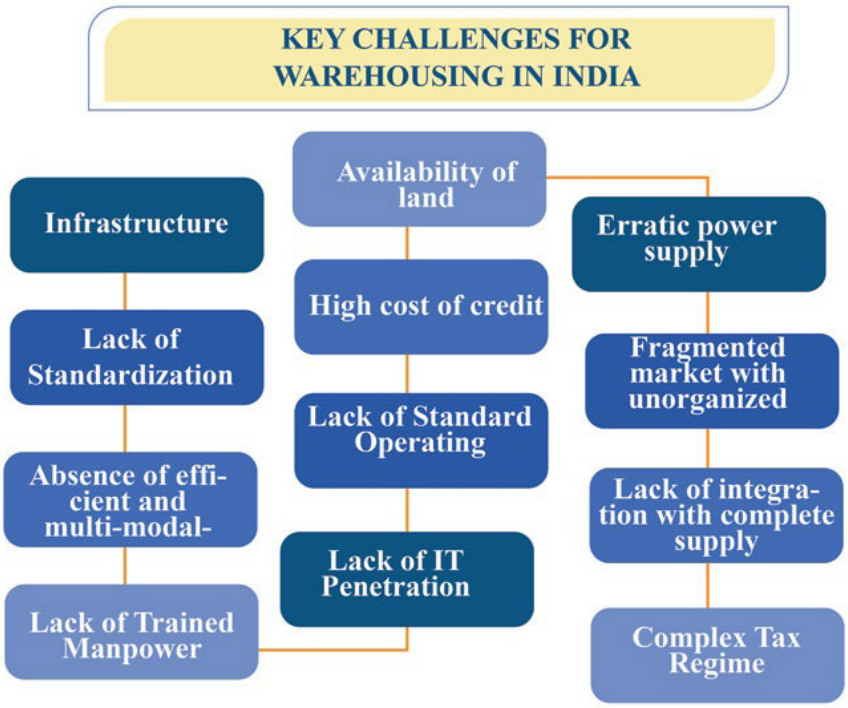
INTEXT QUESTIONS 14.1

1. In order to ensure _____ of food-grains, it is very much essential to preserve the commodities till the next crop.
2. Fluctuation in prices of goods takes place because of _____ as per demand.
3. _____ provides services for inventory management and helps in balancing supply and demand.
4. Warehouse technologies like Bar-coding or RFID (Radio Frequency Identification Devices) tagging, etc. are used _____ in the warehouses.
5. The process of moving goods in reverse order from their final destination is known as _____.
6. The standard operating procedure of the warehouses provides for taking all _____ from various factors responsible for losses and damages during storage.
7. Do warehouses help in price stabilisation?

14.3 KEY CHALLENGES FOR WAREHOUSING IN INDIA

The Warehousing Industry in India in the private sector is largely controlled by unorganised players. Large numbers of such warehouses are traditional in structure and operate with an average size of approximately 10,000 square feet. Most of these warehouses have poor infrastructure, lack of standards and specifications, non-compatibility for mechanised operations, inefficient operations, resulting in pilferages and losses. In India majority of the warehousing (82%) is non-mechanized. and the balance 18%, the so called mechanised warehouses, just have facilities like forklift or handheld hydraulic pallet trucks.

In spite of emerging opportunities in the warehousing and logistics sector, its full potential is yet to be harnessed. There are a number of challenges being faced by Indian warehousing industry, which are elaborated as under:



1. **Infrastructure:** The warehousing industry in India is highly fragmented and disorganised in nature leading to poor infrastructure. Though there has been massive growth in the road/rail infrastructure, it is still inadequate to provide quality services, mainly in the rural areas.

A. Availability of land:

With rapid urbanisation, availability of land at strategic locations is a big challenge. The lack of clear land classifications in Indian cities and the reclassification of land are major

concerns as far as the development of warehouses is concerned. Cost of land in the logistic hubs have been unaffordable to set up a warehousing facility with adequate infrastructure.

B. Erratic power supply

Regular power supply is required to operate storage structures on a consistent basis mainly cold stores and controlled atmosphere storage. Power failures are a major problem currently plaguing cold chains, leading to huge wastages of agri-products every year in India. Absence of regular power supply at a reasonable cost is a major deterrent for the growth of the warehousing sector, which further adds to the warehousing cost of agri-products and makes it uneconomical.

C. Lack of standardisation

Quality of warehouses is a major concern as either the standards available are very old and not suitable to match with the changing industry requirement or there are no standards available for different types of warehouses created by the industry to meet their specific needs. This situation is a big challenge to regulatory compliance. There are multiple regulators for different components of the logistics sector with roles very thinly demarked resulting in poor monitoring and surveillance for compliance with rules/standards.

D. High cost of credit

Non availability of adequate and timely credit at a reasonable cost is a critical factor. The main reason for this has been the high risk as perceived by banks about the un-organized nature of this sector and the high transaction costs for loan appraisal. Since a majority of the players in this sector are small or medium entrepreneurs, they are unable to provide collateral in order to avail of loans from banks and other financial institutions.

E. Fragmented market with unorganised players

There has been massive growth in warehousing capacity but the sector is highly unorganised and fragmented. As a result, there is a highly underutilised capacity of warehouses created in a number of non-potential areas. On the contrary, there happens to be an acute shortage of warehousing facilities in niche areas. Transport and cold-chain logistics solutions are also dominated by unorganised small operators resulting in highly unreliable service coupled with breakdowns and damages to the cargo. There is shortage of organised big players in this sector.

F. Absence of efficient and multi-modal-transport system

India is yet to fully develop a multi-modal transport system which could essentially harness

the full capabilities of road, rail, sea, and air transport infrastructure**.** Due to the inefficient multimodal logistics system, the goods are not carried end to end but held in transit at frequent locations leading to multiple handling, long transit time, and high costs. Efficient system is expected to reduce the overall logistics costs and extend the marketability of Indian companies by economies of scale. It will also facilitate the migration of companies from existing warehouses to future ready warehouses.

G. Lack of Standard Operating Procedures (SOPs)

Many service providers don't maintain standard operating procedures, leading to frequent system failures, losses to warehoused goods, breakdown of services, accidents, frauds and non-settlement of insurance claims.

H. Lack of integration with complete supply chain

Different components of supply chains work in a fragmented standalone manner leading to unsynchronized service patterns. This causes unexpected delays and damages adversely impacting credibility of the system.

I. Lack of trained manpower

The warehousing operations in different sectors are highly specialised and need human resources with varied skill sets to handle various levels of managerial functions as well specialised services related to each sector. There is a dearth of training institutions to provide skill and capacity building through customised and tailor-made programmes. There is also a lack of good trainers to impart such specialised training. The challenge is higher in the manufacturing and retailing sector which require a mix of technology, managerial competence and sales/ marketing skills. Entrepreneurship development in this sector is also a big challenge. Intelligent, automated and organised warehousing is the need of the hour to meet the requirements of Industry.

J. Lack of IT penetration

The warehousing sector in India, with some exceptions, is characterised by low penetration of technology that acts as a handicap in the emerging Indian economy. Large numbers of public sector warehouses and small rural warehouses including cooperatives badly lack IT skills and are thus not confident in adopting computer aided operations. These entities are left behind in the fast growing industry

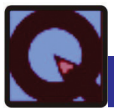
K. Complex Tax Regime

Before the implementation of a uniform tax structure Goods & Service Tax (GST), the majority of manufacturers in India used to maintain their warehouses across the marketing

network to avoid taxation under interstate sale under the Central Sales Tax Regime (CST). The implementation of GST i.e. single tax structure across Indian states is expected to do away with this practice of operating through small, scattered warehouses to large, mechanised, centrally monitored warehousing in India which will bring cost efficiency to industry and service sector engaged in non agri-warehousing. In case of agri-warehousing, though implementation of GST helps in avoiding applicable state level sales and Centre level sales tax and excise duty structure but applicable varying MandiCess across states and multiplicity of incidence of Mandicess pose a big challenge.

Activity:

Why should I invest in warehouses when I can get everything from the market?



INTEXT QUESTIONS 14.2

1. Availability of land at strategic locations is a big challenge because

   i) The lack of clear land classifications in Indian cities

   ii) Cost of land

   iii) Both i & ii.

   iv) None of these.

2. Power failures is a major problem currently plaguing cold chains, leading to-

   i) Huge wastages of agri-products every year in India.

   ii) High cost of preservation.

   iii) Not an issue.

   iv) Both I & ii.

3. Lack of Standard Operating Procedures (SOPs) results in

   i) Frauds, accidents,

   ii) Losses to warehoused goods,

   iii) Non-settlement of insurance claims.

   iv) All of the above.

14.4 WAREHOUSING TOOL OF ECONOMIC DEVELOPMENT

Massive growth in the logistics sector has influenced the growth of the warehousing sector as well. Integration of various ancillary services with the core warehousing business has been observed. These changes have encouraged the entry of many new players in the sector and opened vast potential in terms of new jobs and service-oriented business opportunities. With likely development of massive rail, road and port infrastructures, growth of warehouses is bound to achieve new dimensions. Transit warehousing is another area which is growing fast. Organisations like Central Rail side Warehouse Company Limited (CRWC), Transport Corporation of India, Airport Authority of India, Container Corporation of India and many other logistics service providers are contributing immensely towards the expansion of transit warehousing facilities. Warehousing , therefore, plays a prominent role in facilitating trade, distribution of goods across different segments and improving economic development.

14.5 BENEFITS OF WAREHOUSING

There are several advantages to the farmers and other stakeholders in availing warehousing services -

a. It gives withholding power to the farmers and helps them realise better prices. It enhances farmer's access to credit against the stored produce by pledging the warehouse receipt.

b. It gives purchasing power to the traders, and acts as collateral security.

c. It tends to cushion price fluctuations and stabilise prices as it equates supply to demand.

d. It facilitates futures trading.

e. It plays a very important role in implementing the agricultural price policy of the country.

f. Huge wastage which occurs owing to improper storage of agricultural produce is minimised.

14.6 COMMODITIES TO BE STORED

The Agricultural Produce (Development & Warehousing) Act of 1956 provided the storage of agricultural produce in the warehouse, which was defined to mean any of the following classes of commodities namely:-

- Food stuffs, including edible oil- seeds;

- Cattle fodder including oil cakes and other concentrates;
- Cotton in different forms;
- Raw jute; and
- Vegetable oils

However the concept of notified commodities was introduced when Warehousing Corporation Act, 1962 was passed. The expression notified commodities has been defined under section 2(e) of this act to mean any commodity (other than agricultural produce) which the Central Government may, by notification in the official Gazette, declare to be notified commodity for the purpose of this act, being a commodity with respect to which Parliament has powers to make laws by virtue of entry 33 in List III in the seventh schedule to the constitution. Accordingly, different commodities are added as notified from time to time by the Government.

INTEXT QUESTIONS 14.3

1. Name 3 logistic service providers.
2. Name which type of commodities was permitted for storage as per Warehousing Corporation Act, 1962.

14.7 SCIENTIFIC STORAGE OF AGRICULTURAL COMMODITIES

Once the stock is accepted and stacked in the warehouse, in charge would be required to exercise all the processes to preserve their quality during storage. Common steps are detailed as under:

A. Hygiene and Sanitation– Sanitation and good housekeeping inside as well as outside storage space is the best pest control measure as proper sanitation not only helps in prevention of pest population build up but also removal of pest habitat. Many a times lack of proper sanitation measures lead to undesirable grain debris in the storage environment, which create most favorable conditions for the growth and development of pests. It therefore calls for timely collection, cleaning of grain spillages not only from the storage structure but from the entire surroundings. It is estimated that proper hygienic conditions along with proper aeration can overcome 85 percent of storage pest problems Growth of undesired vegetation in the premises, cracks in walls and floors, leakage in the roof, damaged doors and ventilators must be checked at periodic time to deny easy accesses to moisture, insects, birds, rats etc.

B. Aeration – Regular circulation of dry and extremely cool air through the stacks helps in killing many insect and microbial pests and in maintaining the moisture at a low level which is good for the health of stored produce. Provision of turbo ventilators and regular opening of godown doors/ventilators during dry/cool weather are helpful in this direction.

C. Procedure for internal verification of stocks – Periodic verification of the quality of stored products in the warehouse is an important procedure to be put in place for knowing the health of the stocks. Normally it is recommended at fortnightly intervals however the warehouse operator can prescribe even a shorter interval depending upon the specific condition of the stored goods.

D. Prophylactic & curative treatments- The fumigant is a chemical that remains in gaseous form in ambient atmospheric conditions and is capable of killing the insects and other harmful pests if exposed to them in a prescribed dosage in an airtight enclosure over a specified exposure period. Fumigation of agricultural produce is undertaken with Aluminium Phosphide which comes in the form of tablets of 3 grams containing 56% of this chemical and the remaining 44% comprising Ammonium carbamate, binding materials, and fillers. A dosage of 3 tablets of this fumigant (9 gram) per tonne or 2.25-gram phosphine gas per cubic metre of the storage volume is recommended with a minimum of 7 days of exposure, under an airtight enclosure to kill all the stages of all insect pests.

a. Rodent pest Control - It is foremost needed to take various preventive measures to check entry of rats in warehouses. These include preventing the entry of rats by maintaining plinth height of nearly 90 centimeters, minimising the gap between doors and floor, sealing gaps/holes in the walls, floors etc. Physical measures like different types of cages and trapping or adhesive boards are used to catch and control rats. The rats may also be controlled with poison baits using rodenticides like zinc phosphide, Barium carbonate, bromadiolone and brodifacoum . The fumigation of rat burrows is also done outside the godowns with aluminum phosphide pellets to kill the outside rats.

- **Turnover of stocks –** It is important to ensure turnover of stock undertaking deliveries in FIFO (first in first out) mode. However, the stock should be liquidated within the shelf life of the product. Deteriorating or substandard products may also be liquidated on priority.

- **Extension of storage period –** When the goods are deposited for storage in a warehouse, the warehouse receipt is issued which is valid for a limited period, within its shelf life. However, in case the depositor wants to extend the validity of the warehouse receipt, it can be done provided the quality of

the goods is retested and it is found within permissible limits. The validity of warehouse receipt, in no case, will be extended beyond the shelf life.

14.8 FACTORS AFFECTING STORABILITY OF AGRI COMMODITIES

The overall objective of grain storage is to preserve the quality which is influenced by various factors, which can cause damage to the stored food materials. These are divided into two categories, (i) Abiotic factors and (ii) Biotic factors.

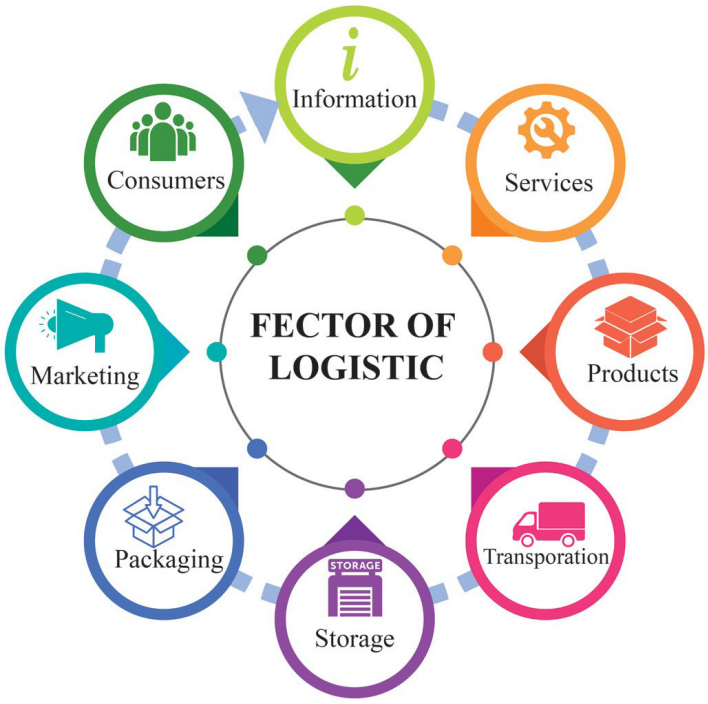


Fig 14.2: **Factors affecting Logistics**

(i) Abiotic factors:

Abiotic factors have a significant role in grain preservation. These are the factors, which are not due to any living organism. Abiotic factors determine the survival, growth and multiplication of biotic factors in the grain storage system. The various abiotic factors which damage the stored food materials are discussed below-

A. Moisture: If the grain moisture content is too high, even the best aeration equipment and monitoring management will not prevent the grain from spoiling - it only delays the inevitable. All micro-organisms, including moulds, require moisture to survive and multiply. Moisture should therefore be prevented from entering the store. The moisture content below which micro-organisms cannot grow is referred to as the

safe moisture content. In general, it is essential that all food stuff is kept below its safe moisture content before they enter the store. Commodities with high moisture levels are prone to infestation and deterioration.

b. Temperature: Temperature is an important factor for the safe storage of food-grains and other food materials as it affects the growth of insects and microorganisms which attack the stored food materials. The insects which attack the stored food-grains have maximum growth rate between 30 – 32 °C. Microorganisms and enzymes which damage the food materials are most active between 30–40 °C. Therefore, the damage to the stored food materials can be significantly reduced by storing them at lower temperatures.

c. Initial grain condition: Grain condition refers to its quality. Grain must be dried to a lower moisture content to allow it to be stored for a longer period of time. Grain quality will not improve during storage. At best, initial quality can only be maintained. During the post-harvest phase, grain undergoes complex biochemical changes termed 'ageing', thereby affecting its quality in long storage**.** The presence of increased amounts of cracked; damaged kernels in stored grains can increase spoilage, thereby reducing its quality. Breakage of grains reduces quality by reducing acceptability and by increasing susceptibility to infestation during storage.

d. Foreign matter: The presence of foreign matter beyond permissible limits induces insect pest activity, impedes effective aeration and also reduces the mercantile value of the stocks besides affecting handling and processing. It renders the grain unfit for consumption and can pose a serious threat to health, probably from micro-contamination with the bacterial products of poor sanitation.

e. Light: Most of the stored grain insect pests are photonegative and tend to show activity after sun sets in search of food. Monitoring and pest control strategies need to be developed accordingly.

B. Biotic factors:

The main biotic agents causing deterioration of stored grains are microorganisms (fungi, bacteria, and yeast/mould), insects and mites, rodents, birds, and metabolic activities. The type of damage varies depending upon the crop variety, type of pest, ecosystem, and storage handling system.

a. Insects: Insects are the major causes of post-harvest grain losses by penetrating the kernels and feeding on the surfaces / endosperm. Insect pests selectively take the nutritious part of the food and encourage the development of bacteria and mould activity. This eventually leads to other storage problems, in turn raising temperatures

and resulting in an increased rate of insect reproduction. Most storage insects carry over from previously stored grain, so it is important to detect any residual infestations.

b. **Microorganisms:** Fungus like Fusariumsps and Rhizoctonia Sp thrive in grains under favourable temperature and moisture conditions and make grain unfit for human consumption. **(Fig 14.3 (a)**)It is, therefore, required to bring moisture to desired level before storing a commodity. Regular aeration also has an important role in checking growth of microorganisms.

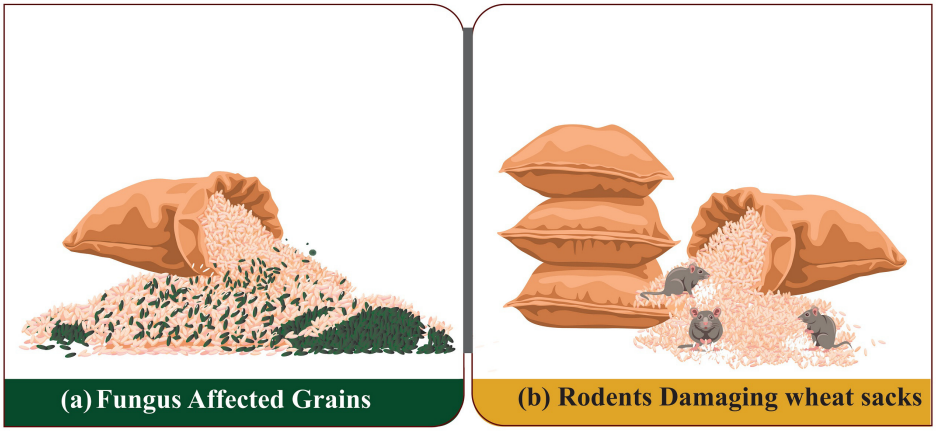


Fig 14.3: **(a) Fungus affected grains and (b) Rodents damaging wheat sack.**

c. **Rodents:** The types of rodents that cause damage and contaminate the food-grains are house rats, mice and bandicoots. They cause damage to commodities by nibbling jute bags and eating food-grains**. (Fig 14.3 (b)**) The quantity of food-grains contaminated by them with their excreta, urine and by shedding the hair, is more than what they actually consume. Normally the warehouses are designed in such a way that the rats do not find an easy entry into the warehouse. Maintenance of hygiene of storage areas and rat proofing of warehouses are the two most effective measures to avoid rat menace.

d. **Birds:** Birds enter a warehouse from various openings in the warehouse and cause loss by consuming the food grains and contaminating them with their droppings. Normally the godown structures are made bird proof by fixing wire mesh at ventilators and providing sliding doors with wire mesh. Wherever sliding doors are not provided, nylon door nets are hung at the doors to prevent the entry.

14.9 GRADING & SAMPLING

Directorate of Marketing and Inspection, an organisation under the Ministry of Agriculture and Farmers Welfare enforces the Agricultural Produce (Grading and Marking) Act, 1937. Under this Act, Grade and Standards are prescribed for agricultural and allied

products in India. Agmark, an acronym for agricultural marketing, is a quality certification mark provided by the Government of India. Farm Level Grading i.e., grading at Producer's Level is also done and Quality Certification Mark provided by AGMARK acts as a third-party guarantee for the Quality Certified. The Legal backup for the same is provided under Agricultural Produce (Grading and Marking) Act, 1937 as amended in 1986.

A. The need for sampling

Batches of grain are rarely uniform in quality even when regarded as acceptable. Pests usually occur non-randomly in stored grain. Consequently the only way of obtaining complete and accurate information about the grain is to carry out a total examination. This may be possible if the quantity to be examined is small, but is usually neither practical nor economical when a large quantity is involved. The choice is either not to examine the consignment at all or to take samples to obtain some information, acknowledging that anything less than a total examination is bound to affect the accuracy of the results.

B. Type of samples

Representative samples are made by combining many smaller samples into one larger composite sample. Representative samples are grain samples that accurately represent a specific quantity of grain, such as the contents of an entire grain lot. The composite sample accurately represents the entire lot of grain. The composite sample can then be used for grading. Drawing of representative samples is an important and essential part of grain analysis. If the sample obtained is not representative, no amount of care in analysis will establish the true quality of grain.

INTEXT QUESTIONS 14.4

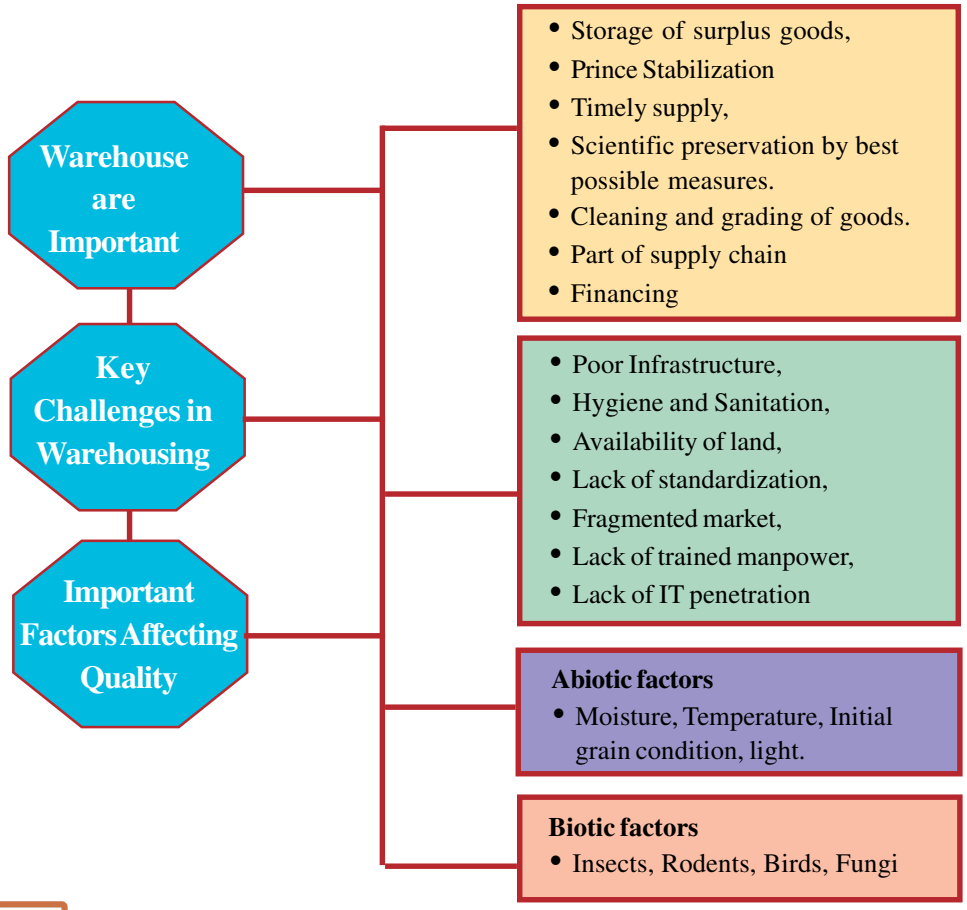
1. _____and _____ in side as well outside storage space is best pest control measure.
2. _____is an effective non chemical practice to improve the storability of grains.
3. Spraying pesticides like Malathion 50EC and Deltamethrin 2.5%WP are called _____.
4. Commodities having high moisture levels are prone to _____.
5. Microorganisms and enzymes which damage the food materials are most active between_____ .
6. The presence of an increased amount of cracked, damaged kernels in stored grains can increase _____ thereby _____its quality.

7. _____ cause damage to commodities by nibbling jute bags and eating food-grains.

8. _____ are grain samples that accurately represent a specific quantity of grain, such as the contents of an entire grain lot.

9. _____ _ is a quality certification mark provided by the Government of India for agricultural marketing.

WHAT YOU HAVE LEARNT



KEY TERMS

Demand and supply	Supply chain	Pledging
Infrastructure	Standard Operating Procedures	Sanitation
Sampling	Abiotic	Biotic

TERMINAL EXERCISE

1. List one important factor which can help in checking micro flora _____ aeration
2. The presence of foreign matter is a biotic factor _____ no
3. Jute is a notified commodity._____ no
4. Write full form of RFID _____
5. Construction of a warehouse is capital intensive, so why waste money on it and manage direct distribution from producer to consumer——— False.
6. Why do we need warehouses?
7. Comment on the statement "Warehousing is a tool of economic development"
8. What do you understand from notified commodities?
9. What is the grading of agricultural commodities required?
10. Briefly list benefits of public warehousing?
11. What important steps are necessary to monitor the health of the food grains in the warehouse?
12. Discuss in detail various functions of the warehouse?
13. What are different types of challenges faced by the Indian warehousing industry?
14. Explain various factors affecting storability of agri commodities?
15. What is Scientific Storage of Agricultural Commodities, please explain?

ANSWERS TO INTEXT QUESTIONS

1. Aeration
2. No
3. No
4. Radio Frequency Identification Devices
5. False

14.1

1. Uninterrupted supply, 2. Inefficient management of supplies, 3 Warehouse,
4. To track the movement of goods 5. Reverse Logistics.
6. The precautions for protecting the goods. 7. Yes

14.2

1. iii 2. iv 3. iv

14.3

1. Central Rail side Warehouse Company Limited (CRWC), Airport Authority of India, Container Corporation of India.
2. Notified Commodities.

14.4

1. Sanitation, good housekeeping
2. Aeration
3. Prophylactic treatments
4. Infestation and deterioration.
5. 30–40 °C.
6. Spoilage, reducing
7. Rats
8. Representative samples
9. Agmark

DO AND LEARN

Do you think grain quality is important and how a warehouse can help in ensuring good quality at all times?