

CHAPTER 1

INTRODUCTION

1.1 Background:

Agriculture is the backbone of Indian Economy. Agriculture is basically an energy conversion industry. A farm is an energy consumer and a producer, because with the use of the different energy inputs, energy output as a crop production is available. India has a major agribusiness sector, which has achieved remarkable successes over the last three and a half decades. Unprocessed foods are susceptible to spoilage by biochemical processes, microbial attack and infestation. The right post harvest practices such as food processing techniques play a significant role in reducing spoilage and extending shelf life.

Harvesting constitutes a major operation among agricultural activities and differs according to the part of the plant to be harvested. Almost all the food, feed, fiber and fuel commodities go through a number of post harvest processing operations such as cleaning, grading, separation, drying, storage, milling, food processing, packaging, transport and marketing before it reaches to the consumers. Agricultural processing is directed towards the conservation of productive and value adding to make the material more readily usable, consumable and economically more remunerative. Harvested grain (threshed / shelled / dried) needs further processing to get rid of various types of contaminations or undesirable matter, viz., inert material, common and grains of noxious weeds, other crop/variety grains, damaged grains and/or off-size grains. Cleaning and grading result in reduced bulk of the material, high value products, safe and longer storage, more out-turn of better quality milled products. Improper cleaning usually results in grain loss. Cleaning helps to reduce bulkiness during subsequent post harvest operations. To remove straw pieces, unfilled grains and other foreign materials, cleaning and winnowing can be done manually, using wind energy or with the use of machines. Traditional winnowers like the winnowing basket and wooden boxes with perforations are used also motorized grain cleaners using electric power are in use.

Separation removes unwanted materials like straws, chaff, weed seeds, soil particles and rubbish from the grain. It improves grain stability, reduces dockage during milling, gives good quality milled and improves the milling output. It also reduces insects, pests and disease infestation. Removing dockage from grain is a common

handling practice Food processing requires clean grains to insure purity. Separation grain for seed also requires considerable cleaning to insure the highest quality seed. Although cleaning grain for marketing purposes may not require the degree of foreign material removal or size separation necessary for food processing or seed cleaning, the same technology is used. The primary differences are throughput rates and the number of cleaning processes to which the grain is subjected. For example, when cleaning for seed, nearly all weed seeds, broken and inferior sized kernels, and other inert material is separated from kernels. Additional separation processes are used to size seed kernels. The degree of dockage removal of grain destined for the market, like wheat used for food or seed, is determined by economics associated with the cleaning activity.

1.2 Necessity

It is required to remove the husk of raw grains to produce whole grains that are sufficiently milled and free of impurities and contain a minimum number of broken grains. The milling yield and quality of product is dependent on the quality of the grains, the cylindrical rollers are used to de-husking of grains.

1.3 Function

The grain separator which works on the solar power and could be used as portable machine. It consist of the rollers which removes the husk of the grain which is further separated by the fan arrangement which removes out the separated husk the other particles like stone etc are separated by the screener and the grain is the collected from the bottom collector of the machine. The husk and dust particles are removed through forced air by a fan which is mounted along the machine.

1.4 Conventional methods of grain separator

A variety of equipments are available for processing of grains. Although variable in type, size, design and speed. All grain processing equipments have one thing in common the separations they effect are based on differences in physical and chemical properties among desirable material (good grains) and undesirable material (contaminants).

1.4.1 Direct harvesting

In the direct harvesting method, all functions, from cutting to cleaning, are performed by one machine called the combine (Figure 12.1). All major crops mentioned above can be harvested directly. There are two main kinds of combines, conventional

types and rotary types. Either of these types may be self-propelled or pulled by a tractor and powered by the PTO drive.

1.4.2 Cutting and windrowing

Some crops that do not lend themselves to direct harvesting are better harvested by cutting and windrowing before threshing, separating, and cleaning. When the crop does not ripen evenly or (as in some northern climates) does not mature fully, cutting and windrowing allows for the crop to cure in the field before threshing. Some crops, such as edible beans, are cut below-ground and windrowed to avoid cutting bean pods.

1.4.3 Grain Milling

Grain milling is the process of removing the husk to produce grains. Grain milling can be undertaken as:

- A one step milling process where the husk is removed in one pass and white grain is produced directly from the raw grain.
- A two-step process where the husk and the bran are removed separately and brown grain is produced as an intermediate product.
- A multistage process where grain passes through a number of different operations and machines from raw grain to white grain.

1.4.3.1 One pass milling

Pestle and mortar

Hand pounding of raw grain in a mortar with a pestle is still practiced in some remote areas. Pounding the raw grain induces upward and downward forces on grain against grain that removes the husk and some bran layers. The pounding also results in a high percentage of broken kernels. The final cleaning is done by winnowing and gravity separation by hand.



Fig. 1.1 Pestle and mortar