Sowing

Selection of seeds of good quality crop strains is the primary stage of sowing. After the preparation of soil, these seeds are dispersed in the field and this is called sowing. Sowing can be done manually, by hand or by using seed drilling machines. Some crops like paddy are first grown into seedlings in a small area and then transplanted to the main field.

Types of sowing[[edit](https://en.wikipedia.org/w/index.php?title=Sowing&action=edit&section=4" \o "Edit section: Types of sowing)]

**Hand sowing**[[edit](https://en.wikipedia.org/w/index.php?title=Sowing&action=edit&section=5" \o "Edit section: Hand sowing)]

**Hand sowing** or (planting) is the process of casting handfuls of seed over prepared ground, or broadcasting (from which the [technological term](https://en.wikipedia.org/wiki/Broadcasting) is derived[*[citation needed](https://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*]). Usually, a drag or [harrow](https://en.wikipedia.org/wiki/Harrow_(tool)) is employed to incorporate the seed into the soil. Though [labor-intensive](https://en.wikipedia.org/wiki/Labor_intensity" \o "Labor intensity) for any but small areas, this method is still used in some situations. Practice is required to sow evenly and at the desired rate. A hand seeder can be used for sowing, though it is less of a help than it is for the smaller seeds of [grasses](https://en.wikipedia.org/wiki/Poaceae) and [legumes](https://en.wikipedia.org/wiki/Fabaceae).

[](https://en.wikipedia.org/wiki/File:Horticulture_Tray3.jpg)

A tray used in [horticulture](https://en.wikipedia.org/wiki/Horticulture) (for sowing and taking plant cuttings)

Hand sowing may be combined with pre-sowing in [seed trays](https://en.wikipedia.org/wiki/Seed_tray). This allows the plants to come to strength indoors during cold periods (e.g. spring in temperate countries).

**Seed drill**[[edit](https://en.wikipedia.org/w/index.php?title=Sowing&action=edit&section=6" \o "Edit section: Seed drill)]

In [agriculture](https://en.wikipedia.org/wiki/Agriculture), most seed is now sown using a [seed drill](https://en.wikipedia.org/wiki/Seed_drill), which offers greater precision; seed is sown evenly and at the desired rate. The drill also places the seed at a measured distance below the soil, so that less seed is required. The standard design uses a fluted feed metering system, which is volumetric in nature; individual seeds are not counted. Rows are typically about 10–30 cm apart, depending on the [crop](https://en.wikipedia.org/wiki/Crop) species and growing conditions. Several row opener types are used depending on [soil type](https://en.wikipedia.org/wiki/Soil_type) and local tradition. Grain drills are most often drawn by [tractors](https://en.wikipedia.org/wiki/Tractor), but can also be pulled by [horses](https://en.wikipedia.org/wiki/Horse). [Pickup trucks](https://en.wikipedia.org/wiki/Pickup_truck) are sometimes used, since little draft is required.

A seed rate of about 100 kg of seed per hectare (2 bushels per acre) is typical, though rates vary considerably depending on crop species, soil conditions, and farmer's preference. Excessive rates can cause the crop to lodge, while too thin a rate will result in poor utilisation of the land, competition with [weeds](https://en.wikipedia.org/wiki/Weed) and a reduction in the [yield](https://en.wikipedia.org/wiki/Crop_yield).

**Open field**[[edit](https://en.wikipedia.org/w/index.php?title=Sowing&action=edit&section=7" \o "Edit section: Open field)]

*Main article:*[*Open field system*](https://en.wikipedia.org/wiki/Open_field_system)

**Open-field planting** refers to the form of sowing used historically in the agricultural context whereby [fields](https://en.wikipedia.org/wiki/Field_(agriculture)) are prepared generically and left open, as the name suggests, before being sown directly with seed. The seed is frequently left uncovered at the surface of the soil before germinating and therefore exposed to the prevailing [climate](https://en.wikipedia.org/wiki/Climate) and conditions like storms etc. This is in contrast to the [seedbed](https://en.wikipedia.org/wiki/Seedbed) method used more commonly in domestic [gardening](https://en.wikipedia.org/wiki/Gardening) or more specific (modern) agricultural scenarios where the seed is applied beneath the soil surface and monitored and manually tended frequently to ensure more successful growth rates and better yields.

**Pre-treatment of seed and soil before sowing**[[edit](https://en.wikipedia.org/w/index.php?title=Sowing&action=edit&section=8" \o "Edit section: Pre-treatment of seed and soil before sowing)]

[](https://en.wikipedia.org/wiki/File:GrowingAvocadoFromSeed.JPG)

Tropical fruit such as [avocado](https://en.wikipedia.org/wiki/Avocado) also benefit from special seed treatments (specifically invented for that particular tropical fruit)

Before sowing, certain seeds first require a treatment prior to the sowing process. This treatment may be seed [scarification](https://en.wikipedia.org/wiki/Scarification_(botany)), [stratification](https://en.wikipedia.org/wiki/Stratification_(botany)), [seed soaking](https://en.wikipedia.org/wiki/Imbibition) or seed cleaning with cold (or medium hot) water.

Seed soaking is generally done by placing seeds in medium hot water for at least 24 to up to 48 hours[[2]](https://en.wikipedia.org/wiki/Sowing#cite_note-2) Seed cleaning is done especially with fruit, as the flesh of the fruit around the seed can quickly become prone to attack from insects or plagues.[[3]](https://en.wikipedia.org/wiki/Sowing#cite_note-3) Seed washing is generally done by submerging cleansed seeds 20 minutes in 50 [degree Celsius](https://en.wikipedia.org/wiki/Celsius) water.[[4]](https://en.wikipedia.org/wiki/Sowing#cite_note-ReferenceA-4) This (rather hot than moderately hot) water kills any organisms that may have survived on the skin of a seed. Especially with easily infected [tropical fruit](https://en.wikipedia.org/wiki/Tropical_fruit) such as [lychees](https://en.wikipedia.org/wiki/Lychee) and [rambutans](https://en.wikipedia.org/wiki/Rambutan" \o "Rambutan), seed washing with high-temperature water is vital.

In addition to the mentioned seed pretreatments, [seed germination](https://en.wikipedia.org/wiki/Seed_germination) is also assisted when a disease-free soil is used. Especially when trying to germinate difficult seed (e.g. certain tropical fruit), prior treatment of the soil (along with the usage of the most suitable soil; e.g. [potting soil](https://en.wikipedia.org/wiki/Potting_soil), prepared soil or other [substrates](https://en.wikipedia.org/wiki/Substrate_(biology))) is vital. The two most used soil treatments are [pasteurisation](https://en.wikipedia.org/wiki/Pasteurisation) and [sterilisation](https://en.wikipedia.org/wiki/Sterilization_(microbiology)). Depending on the necessity, pasteurisation is to be preferred as this does not kill all organisms. Sterilisation can be done when trying to grow truly difficult crops. To pasteurise the soil, the soil is heated for 15 minutes in an oven of 120 °C.[[4]](https://en.wikipedia.org/wiki/Sowing#cite_note-ReferenceA-4)

manuring

Crops need nutrients to grow and produce yield. Thus, the supply of nutrients at regular intervals is necessary. Manuring is the step where nutritional supplements are provided and these supplements may be natural (manure) or chemical compounds (fertilizers). Manure is the decomposition product of plant and animal wastes. Fertilizers are chemical compounds consisting of plant nutrients and are produced commercially. Apart from providing nutrients to crop, manure replenishes soil fertility as well. Other methods for soil replenishment are vermicompost, crop rotation, planting of leguminous plants.

Types

**Animal manure**

[](https://en.wikipedia.org/wiki/File:Manure_pools_in_Haikou_01.jpg)

[Concrete](https://en.wikipedia.org/wiki/Concrete) reservoirs, one new, and one containing cow manure mixed with water. This is common in rural [Hainan](https://en.wikipedia.org/wiki/Hainan) Province, [China](https://en.wikipedia.org/wiki/China).

Most animal manure consists of [feces](https://en.wikipedia.org/wiki/Feces" \o "Feces). Common forms of animal manure include farmyard manure (FYM) or farm slurry ([liquid manure](https://en.wikipedia.org/wiki/Liquid_manure)).[[2]](https://en.wikipedia.org/wiki/Manure#cite_note-2) FYM also contains plant material (often straw), which has been used as bedding for animals and has absorbed the feces and [urine](https://en.wikipedia.org/wiki/Urine). Agricultural manure in liquid form, known as [slurry](https://en.wikipedia.org/wiki/Slurry), is produced by more intensive livestock rearing systems where concrete or slats are used, instead of straw bedding. Manure from different animals has different qualities and requires different application rates when used as fertilizer. For example [horses](https://en.wikipedia.org/wiki/Horse), [cattle](https://en.wikipedia.org/wiki/Cattle), [pigs](https://en.wikipedia.org/wiki/Pig), [sheep](https://en.wikipedia.org/wiki/Sheep), [chickens](https://en.wikipedia.org/wiki/Chicken), [turkeys](https://en.wikipedia.org/wiki/Turkey_(bird)), [rabbits](https://en.wikipedia.org/wiki/Rabbit), and [guano](https://en.wikipedia.org/wiki/Guano) from [seabirds](https://en.wikipedia.org/wiki/Seabird) and [bats](https://en.wikipedia.org/wiki/Bat) all have different properties.[[3]](https://en.wikipedia.org/wiki/Manure#cite_note-3) For instance, sheep manure is high in nitrogen and potash, while pig manure is relatively low in both. Horses mainly eat grass and a few weeds so horse manure can contain grass and weed seeds, as horses do not digest seeds the way that cattle do. Cattle manure is a good source of nitrogen as well as organic carbon.[[4]](https://en.wikipedia.org/wiki/Manure#cite_note-Bernal-4) Chicken litter, coming from a bird, is very concentrated in nitrogen and phosphate and is prized for both properties.[[4]](https://en.wikipedia.org/wiki/Manure#cite_note-Bernal-4)[[5]](https://en.wikipedia.org/wiki/Manure#cite_note-Lustosa-5)

Animal manures may be adulterated or contaminated with other animal products, such as [wool](https://en.wikipedia.org/wiki/Wool) ([shoddy](https://en.wikipedia.org/wiki/Shoddy) and other [hair](https://en.wikipedia.org/wiki/Hair)), [feathers](https://en.wikipedia.org/wiki/Feather), [blood](https://en.wikipedia.org/wiki/Blood), and [bone](https://en.wikipedia.org/wiki/Bone). Livestock feed can be mixed with the manure due to spillage. For example, chickens are often fed [meat and bone meal](https://en.wikipedia.org/wiki/Meat_and_bone_meal), an animal product, which can end up becoming mixed with chicken litter.

**Compost**

*Main article:*[*Compost*](https://en.wikipedia.org/wiki/Compost)

[](https://en.wikipedia.org/wiki/File:NRCSAR02028_-_Arkansas_(239)(NRCS_Photo_Gallery).jpg)

Compost containing turkey manure and wood chips from bedding material is dried and then applied to pastures for fertilizer.

[Compost](https://en.wikipedia.org/wiki/Compost) is the decomposed remnants of organic materials. It is usually of plant origin, but often includes some animal dung or bedding.

**Green manure**

[Green manures](https://en.wikipedia.org/wiki/Green_manure) are crops grown for the express purpose of [plowing](https://en.wikipedia.org/wiki/Plow" \o "Plow) them in, thus increasing fertility through the incorporation of nutrients and organic matter into the soil. [Leguminous plants](https://en.wikipedia.org/wiki/Legume) such as clover are often used for this, as they [fix nitrogen](https://en.wikipedia.org/wiki/Nitrogen_fixing) using [*Rhizobia*](https://en.wikipedia.org/wiki/Rhizobia) bacteria in specialized [nodes](https://en.wikipedia.org/wiki/Root_nodule) in the root structure.

Other types of plant matter used as manure include the contents of the [rumens](https://en.wikipedia.org/wiki/Rumen) of slaughtered [ruminants](https://en.wikipedia.org/wiki/Ruminant), [spent grain](https://en.wikipedia.org/wiki/Spent_grain) (left over from [brewing](https://en.wikipedia.org/wiki/Brewing) [beer](https://en.wikipedia.org/wiki/Beer)) and [seaweed](https://en.wikipedia.org/wiki/Seaweed).

### ****Weeding****

## Weeds are unwanted plants which grow among crops. They are removed by using weedicides, by manually pulling them with hands and some are removed during soil preparation.

## Reasons to weed[[edit](https://en.wikipedia.org/w/index.php?title=Weeding_(library)&action=edit&section=1" \o "Edit section: Reasons to weed)]

A "well-maintained, well-pruned collection is far more useful than one filled with out-of-date or unused materials."[[2]](https://en.wikipedia.org/wiki/Weeding_(library)#cite_note-CDaM-2) Weeding a physical collection has many benefits:[[1]](https://en.wikipedia.org/wiki/Weeding_(library)" \l "cite_note-CREW-1)

* Space is preserved to add relevant materials.
* Patrons are able to access useful material quickly, and the librarian can direct them to information more easily.
* The collection is more reputable because it is current.
* The librarian can easily see the strengths and weaknesses of the collection.
* Materials are of good quality and physical condition.

With many collections having a digital component, space is not an issue for concern. However, this does not mean digital collections should not be weeded. "Clearing out unused materials makes a patron’s searching experience better by reducing the number of old and irrelevant records the patrons must wade through in their search results to find what they really want."[[2]](https://en.wikipedia.org/wiki/Weeding_(library)#cite_note-CDaM-2) The digital collection, like the physical collection, should be kept current and easily accessible.

## Weeding criteria[[edit](https://en.wikipedia.org/w/index.php?title=Weeding_(library)&action=edit&section=2" \o "Edit section: Weeding criteria)]

Weeding should be addressed in a library's [collection development](https://en.wikipedia.org/wiki/Collection_development) policy, and the criteria should be outlined. The following list outlines some considerations for weeding resources.[[1]](https://en.wikipedia.org/wiki/Weeding_(library)#cite_note-CREW-1)

* Poor content
  + Content is outdated or obsolete
  + Content is biased, racist, or sexist
  + Content is irrelevant to patron needs (or not being used in a school's curriculum)
  + Content is too mature/immature for patrons (especially important for school libraries)
* Poor condition
  + Resource has irreparable damage (torn pages, broken spines)
  + Resource is dirty or smelly
  + Resource would not survive further circulation
* Poor circulation
  + Resource is not being used by patrons in a certain time frame
* Other considerations
  + Multiple copies that are not needed
  + Enough other resources on a particular subject
  + Should the item be replaced and the cost of replacement
  + Visual appeal of item (including artwork)

## Weeding issues[[edit](https://en.wikipedia.org/w/index.php?title=Weeding_(library)&action=edit&section=3" \o "Edit section: Weeding issues)]

Weeding may be viewed as controversial by community members. John N. Berry III has discussed these is his essay, "The Weeding War".[[3]](https://en.wikipedia.org/wiki/Weeding_(library)#cite_note-3) The controversial nature of collection weeding necessitates the educating of library staff. It provides them with "the tools they need to counter common perceptions or misperceptions regarding weeding", especially those encountered from faculty in an academic library.[[4]](https://en.wikipedia.org/wiki/Weeding_(library)#cite_note-4)

**Harvesting**

Once the crop is matured, it is cut and gathered, this process is called harvesting. Followed by harvesting, grains are separated from the chaff either by threshing, or manually in small scale (winnowing).

 is the process of gathering a ripe crop from the [fields](https://en.wikipedia.org/wiki/Field_(agriculture)). **Reaping** is the cutting of [grain](https://en.wikipedia.org/wiki/Grain) or [pulse](https://en.wikipedia.org/wiki/Pulse_(legume)) for harvest, typically using a [scythe](https://en.wikipedia.org/wiki/Scythe), [sickle](https://en.wikipedia.org/wiki/Sickle), or [reaper](https://en.wikipedia.org/wiki/Reaper) .[[1]](https://en.wikipedia.org/wiki/Harvest#cite_note-1) On smaller [farms](https://en.wikipedia.org/wiki/Farm) with minimal [mechanization](https://en.wikipedia.org/wiki/Mechanization), harvesting is the most [labor](https://en.wikipedia.org/wiki/Manual_labour" \o "Manual labour)-intensive activity of the growing season. On large mechanized farms, harvesting uses the most expensive and sophisticated [farm machinery](https://en.wikipedia.org/wiki/Farm_machinery), such as the [combine harvester](https://en.wikipedia.org/wiki/Combine_harvester). Process automation has increased the efficiency of both the seeding and harvesting processes. Specialized harvesting equipment utilizing [conveyor belts](https://en.wikipedia.org/wiki/Conveyor_belt) to mimic gentle gripping and mass-transport replaces the manual task of removing each [seedling](https://en.wikipedia.org/wiki/Seedling) by hand.[[2]](https://en.wikipedia.org/wiki/Harvest#cite_note-2) The term "harvesting" in general usage may include immediate [postharvest](https://en.wikipedia.org/wiki/Postharvest) handling, including cleaning, sorting, packing, and cooling.

The completion of harvesting marks the end of the growing season, or the growing cycle for a particular crop, and the social importance of this event makes it the focus of [seasonal](https://en.wikipedia.org/wiki/Season) celebrations such as [harvest festivals](https://en.wikipedia.org/wiki/Harvest_festival), found in many [religions](https://en.wikipedia.org/wiki/Religion).

## uses[[edit](https://en.wikipedia.org/w/index.php?title=Harvest&action=edit&section=3)]

*Harvesting* commonly refers to [grain](https://en.wikipedia.org/wiki/Cereal) and produce, but also has other uses: [fishing](https://en.wikipedia.org/wiki/Fishing) and [logging](https://en.wikipedia.org/wiki/Logging) are also referred to as harvesting. The term harvest is also used in reference to [harvesting grapes](https://en.wikipedia.org/wiki/Harvest_(wine)) for [wine](https://en.wikipedia.org/wiki/Wine). Within the context of [irrigation](https://en.wikipedia.org/wiki/Irrigation), *water harvesting* refers to the collection and run-off of rainwater for agricultural or domestic uses. Instead of *harvest*, the term *exploit* is also used, as in exploiting fisheries or water resources. [*Energy harvesting*](https://en.wikipedia.org/wiki/Energy_harvesting) is the process of capturing and storing [energy](https://en.wikipedia.org/wiki/Energy) (such as [solar power](https://en.wikipedia.org/wiki/Solar_power), thermal energy, [wind energy](https://en.wikipedia.org/wiki/Wind_energy), salinity gradients, and [kinetic energy](https://en.wikipedia.org/wiki/Kinetic_energy)) that would otherwise go unexploited. *Body harvesting*, or [*cadaver*](https://en.wikipedia.org/wiki/Cadaver)*harvesting*, is the process of collecting and preparing cadavers for [anatomical](https://en.wikipedia.org/wiki/Anatomy) study. In a similar sense, [*organ harvesting*](https://en.wikipedia.org/wiki/Organ_harvesting) is the removal of tissues or organs from a donor for purposes of transplanting.

In a non-agricultural sense, the word "harvesting" is an economic principle which is known as an exit event or [liquidity event](https://en.wikipedia.org/wiki/Liquidity_event). For example, if a person or business was to cash out of an ownership position in a company or eliminate their investment in a product, it is known as a harvest strategy.[[4]](https://en.wikipedia.org/wiki/Harvest#cite_note-4)

### ****Storage****

Grains yielded are stored in granaries or bins at godowns for later use or marketing. Therefore, methods of [crop protection](https://byjus.com/biology/crop-protection/) need to be better. In order to protect grains from pest and rodents- cleaning, drying, fumigation, etc., are done prior to storing.

**Types**

**Underground Storage Structures**

Underground storage structures are dugout structures similar to a well with sides plastered with cowdung. They may also be lined with stones or sand and cement. They may be circular or rectangular in shape. The capacity varies with the size of the structure.

**Advantages**

* Underground storage structures are safer from threats from various external sources of damage, such as theft, rain or wind.
* The underground storage space can temporarily be utilized for some other purposes with minor adjustments; and
* The underground storage structures are easier to fill up owing to the factor of gravity.

**Surface storage structures**

Foodgrains in a ground surface structure can be stored in two ways - bag storage or bulk storage.

1. Bag storage

* Each bag contains a definite quantity, which can be bought, sold or dispatched without difficulty;
* Bags are easier to load or unload.
* It is easier to keep separate lots with identification marks on the bags.
* The bags which are identified as infested on inspection can be removed and treated easily; and
* The problem of the sweating of grains does not arise because the surface of the bag is exposed to the atmospheres.

1. Bulk or loose storage