

<p>Land Preparation & Crop Establishment</p>	<p>What you need to know about land preparation</p> <p>Rice can be grown in 3 different ecologies. These are the irrigated, lowland rain fed and upland rain fed ecologies respectively.</p> <p>Each of these ecologies has their own specific ways of preparing land.</p> <p>Land preparation in irrigated fields</p> <p>Before the land is prepared all the water channels must be put in place. This should be done in consultation with the irrigation engineer who will give the design on how they should be made. The plot or the farm should have provision for a water inlet and outlet as well as some drainage canals. There is need also for a road to facilitate transport of farm inputs and the produce after harvesting. Some bands that are meant to contain water in the farm should also be erected on all sides of the farm. These bands are usually 1-2 feet high. Before ploughing ensures that the field is free from any stumps, rocks, stubble and any other materials that may hinder the smooth ploughing of the field. For a new field, plough the land using a disc plough and let it stay for a period of 1-2 weeks to kill the weeds and shrubs. Flood the plot with water to a depth of half a foot and let it stay in that condition so as you start preparing the seedling nursery.</p> <p>Nursery preparation</p> <p><i>Siting of the seedling nursery</i></p> <p>The nursery should always be at the drain side (outlet) of the major field to be planted with rice. It must be prepared first before the seeds are soaked. It should always be at the lower side of the field and the siting of the nursery in that area is meant to ensure that the seedlings are adequately supplied with water at all times. One bag of rice seed (80 kgs) is enough to plant 4 acres of land. Hence for one acre plot, it will require 20-25 kilograms of seed for random planting and to cater for losses in the process of seed germination. For line planting 10 kilograms of seed is required and the seed planted in an area of 4 x 6m (24m²). The advantages of planting in line helps in using less seed and hence saving in resources to be used in purchasing the seed. It also helps in the undertaking of other activities such as weeding easy. In most cases the nursery plot is prepared at the same time as the main field. After rotavating the main plot of land, the plot where the nursery will be established is marked out by putting some levees (raised platform around the nursery bed).</p> <p>Once the bed has been made, the farmer has to make a choice of the variety to plant. The seed for the selected</p>
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variety should be of good quality in order to ensure healthy and vigorous growing seedlings.

Seed conditioning before planting in the nursery

Seed treatment

This involves soaking the seed in water for 24 hours. However, the water should be changed after 12 hours. This is in order to break the seed dormancy and quicken germination since the testa of the rice seed is hard. After removing the seed from the water at the expiry of the 24 hours, the seed should be incubated for another 48 hours. Incubation is done by placing the seed in a warm place at room temperature and covering it with either gunny bags or rice straw. Thereafter the seed is sprinkled with water from time to time to ensure that it is wet always. The seed should also be turned after every 12 hours to ensure even moisture distribution. If you must use a polythene bag to put the seed, you must ensure that you **DO NOT** cover it up otherwise the seed will cook.

Planting the seed in the nursery

After making the levees in the nursery plot, ensure that the field is paddled and leveled. During this process, manure should be applied and mixed thoroughly with the soil in order to improve the soil structure. Two to three days before planting the seed in the nursery bed, carry out the final paddling by hand in order to remove the weeds. Apply either DAP or TSP fertilizer. During the day of sowing the seed, the soil should have settled and the field level. Sowing of the seed can be done by broadcasting. At the time of sowing, ensure that you create a walking path of about half a foot wide. The seed should be sown in beds of 1m wide and in water. Ensure that the seeds are covered in the soil to prevent birds from eating them. The water helps in giving the seed a soft landing. After sowing the seed, remove the water from the nursery bed slowly on the same day of seed sowing. However, there has to be some continuous water management in the bed through flash flooding in the 3rd day and continue doing that until the 7th day when you can allow a thin film of water of around 2cm to ensure that the soil does not dry and crack. Thereafter progressively increase the level to 1 inch as the seeds germinate and grow into plants in order to ensure that they grow into healthy seedlings. On the 12th day the germinating seedlings should be top dressed using SA. Two kilograms should be enough for the nursery. The fertilizer is applied through broadcasting onto the growing seedlings. However, this must be done when the sun is high from 10.00 o'clock) and the seedlings are free from dew in order to avoid some scorching effect. A healthy rice

seedling should be short and stout. The seedlings depending on the variety should remain in the nursery for 18-24 days for early maturing varieties and 22-24 days for the long duration varieties. For cooler regions such as Mwea, the seedlings should remain in the nursery for 22-28 days. Transplanting should start at the 22nd day and end on the 28th day. For warmer regions such as Mombasa, Ahero and Bunyala, the seedlings should remain in the nursery for 18-21 days. Other varieties such as IR can be transplanted in 15 days, while Basmati would take 21-25 days.

Transplanting

As the seedlings are growing in the nursery, the main plot that will have been flooded is rotavated. Rotavating has the advantage of performing three operations at once. These are ploughing, harrowing and leveling at the same time.

Before the seedlings are transplanted into the main field, there is need to carry out the final paddling/rotavating. This is done either by hand or by an animal drawn leveler. The idea is to remove weeds and breakdown the remaining soil clods. This activity should be carried out 3-4 days before the transplanting exercise. Manure can also be applied during this time or should have been applied during the second paddling. Some fertilizer is also applied just a day before the transplanting exercise by broadcasting and during that time, water should be reduced to almost zero level. The kind of fertilizer applied is Murate of potash at the rate of 50 kgs per acre. On the 18th day As the seedlings are uprooted from the nursery, sufficient water should be applied at the nursery to about 2 inches and the seedlings uprooted at an angle of 45^o starting from the end of the field. This makes the uprooting exercise easier and at the same time wash out the soil from the roots in order to make the transplanting activity more effective. As the seedlings are being transplanted, the amount of water in the field should be reduced to a thin film of 1cm or for that matter a thick porridge. The seedlings are then planted either randomly or in line at a spacing of 15cm x 20cm for (basmati) medium tillering varieties and 25cm x 25cm for the high tillering varieties. Plant 1 seedling per hole. One week after the planting is complete, flash the field with water. This is done by applying water to a level of about 50% of the plant height and let the water stay for one hour to fill the cracks and thereafter it is released out of the plot. On the 10th day, put a thin layer of water of about 1 inch. On the 20th day, the crop is top dressed using sulphate of ammonia at the rate of 50 kilograms per acre by means of broadcasting. In that process of broadcasting, make sure that

your hands do not come into contact with water otherwise your hands might burn. Weeding can also be done by use of a push weeder. Insecticide and fungicides are also applied during that time at their recommended rates.

Lowland rain fed

It is recommended that the land be ploughed and harrowed to a finer tilth before the rains. Some temporary bands are then created around the land to retain water in the plot when it rains to ensure that the soil is constantly moist. The seeds are then soaked overnight immediately after the rains and planted the following day. Planting is done by drilling at a spacing of 20cm or 25cm. During planting, some DAP fertilizer is applied at the rate of 50 kilograms per acre. The seedlings are later on thinned on the 10th day depending on their condition. The 1st thinning is done to remove those seedlings that are out of the line. Second and third thinning is done between the 11th and 14th days respectively and it is done to ensure that the seedlings are at their right spacing. Weed control will be done manually by use of a jembe or a hoe. Fungicides and pesticides are applied as per recommendation. The bands around the crop should be free from weeds in order to keep away rodents.

Upland rain fed

This is done in the same way like the above except that the land is not banded but is well prepared to a fine tilth. Dry planting can also be done but has to be well timed to coincide with the onset of the rains. Fertilizer application can be done through basal application with DAP at the rate of 50 kilograms per acre. Top dressing should be done at 20 days after germination. This is done preferably in the long rains since during the short rains, a few farmers will plant the crop and it will make it difficult to keep away birds.

- [The components of land preparation](#)

The components of land preparation involve bush clearing to remove shrubs and stumps. The land is then ploughed using a disc plough. The bands and water channels as well access roads are established. For a lowland irrigated field, lowland rain fed and upland rain fed, the processes thereafter follow the same way as for land preparation above.

- [An overview of tillage](#)

Land preparation covers a range of soil disturbances from zero tillage which minimizes soil disturbance through to a totally puddle soil which actually destroys soil structure. Since the soil is a complex by biophysical medium having both living and non-living components, any tillage operation has more than one effect. The tillage requirements will vary according to the cropping system to be used. A good

	<p>example is the comparison between the lowland and upland systems. Typically for lowland rice, fields are puddle in part to destroy structure and develop a hard pan to reduce water loss through deep percolation. Such a loss of structure and the formation of the physical barrier are totally undesirable in an upland situation.</p>
	<p>- Primary Tillage</p> <p>This is the first operation to be undertaken in the land to open it up for cultivation. It is the most aggressive tillage operation. It is normally undertaken when the soil is wet enough to allow the field to be ploughed and strong enough to give reasonable levels of traction or grip to the tractor. This can be immediately after the crop harvest or at the beginning of the next wet season. Primary tillage are to till the soil to attain a reasonable depth of 15 cm with varying clod sizes, kill weeds by burying them and exposing the roots, prevent soil erosion and encourage water accumulation and to chop and incorporate crop residues.</p>
	<p>- Primary Tillage Implements</p> <p>The following are the primary tillage implements: Tractors Oxen These are sources of power. The implements include the plough (mould board and disc) and chisel plough.</p>
	<p>- Secondary Tillage</p> <p>Secondary tillage is the second operation that is carried out in the land after primary tillage. It is carried out to achieve the following:</p> <ul style="list-style-type: none"> - Reducing the clod size - Weed control - Incorporation of fertilizers - Puddling <p>Leveling the soil surface</p>
	<p>- Secondary Tillage Implements</p> <p>The following is the list of the secondary tillage implements</p> <ul style="list-style-type: none"> - Harrow - Spring tine harrow - Leveler - Puddler - Spike tooth harrow - Rotary tiller
	<p>- Upland Tillage</p> <p>Upland tillage is carried out in areas where crops are grown in aerated conditions. Usually there is no free standing water in the fields. It is suitable for planting the upland rain fed rice varieties.</p>
	<p>- Tillage Patterns</p>

	<p>There are three patterns of tillage. These are circular tillage pattern, up and back or headland pattern and the third is the land system. The circular pattern involves the machine working along a boundary and continues along the other boundaries of the land returning to its starting point. The pattern works from the outside to the centre of the field and is commonly used with mould board and offset disc ploughs. The up and back pattern involves the field being ploughed in runs that are parallel to one another. It starts at one boundary of the field and ends at the opposite with turns being made on the headland. The land systems require ploughing to start from the centre of the field and work out to the edges. This system is mostly preferred as it does not leave a dead furrow at the centre of the field.</p>
	<p>- Creating a 'Hard Pan'</p> <p>A hard pan is a crust that is formed or an impervious layer that is formed to stop deep percolation of water below the root zone of the crop after successive cultivation at the same ploughing depth. This will have to be broken down with time in order to enable water and air to get into the deeper layers of the soil. In order to break it down, a chisel plough is used for the purpose.</p>
	<p>- Power Requirements</p> <p>The power requirements for any tillage equipment will depend on the ploughing depth, soil moisture content as well as the soil texture. Speed of operation on the other hand will have an effect on the power requirements. The actual range of working speed for each operation is relatively constant and therefore the speed effect is minimal.</p>
	<p>- Setting up an implement for use</p> <p>These are the preparations that are done to the tractor and the implements before they are taken to the field for operation. This should be done to ensure proper working and safety of the implements. Among the operations that are carried out include checking the water level in the tractor, engine oil level, check on battery water, and ensure that the tyres are properly inflated. To the side of the implements, ensure that the bolts and nuts are well tightened, greasing should be done, the implements should be well mounted to the tractor</p>
	<p>- Land Leveling</p> <p>Refer to the land preparation above</p>
	<p>- Plant Establishment</p> <p>The rate of plant establishment is usually affected by three factors. These are the quality of seed, environment in which the seed is placed and the manner in which the seed is metered and delivered. The number of plants established and</p>

	<p>the seedling vigor will affect the competitiveness of the crop against weeds and ultimately determine the final yield potential.</p>
	<p>- Laser Leveling This involves the rotavating and leveling of a paddy field at the same time. They are mostly preferred because they reduce the number of operation to be carried out in the field. These equipments are however not available as of now. They are only found in IRRI.</p>