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Banana Cultivation Guide

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Banana Cultivation Guide

General Guide in Banana Cultivation

Growing bananas does not require much effort but to achieve high yields requires skills, dedication, and proper planting methods. Below are some pertinent guides that any Banana growers should be aware of. The list is not exhaustive and certainly requires some adjustments depending on the variety of the Bananas.

1. Agro Climate & Soil

Agro Climate

Bananas need warm subtropical climate, adequate moisture and protection from wind. Most varieties of Bananas grow best with 12 hours of bright light and high humidity of 50% or higher. The ideal temperature range is around 26-30°C (78-86F) with RH regime of 75-85%. Growth begins at 18°C, reaches optimal growth at 27°C and stop entirely when temperature reaches 38°C. Although Bananas grow best in bright sunlight, high temperature will scorch leaves and fruit.

For best appearance and higher photosynthetic rate, wind protection is advisable. High velocity wind which exceeds 80km per hour damages the leaf. Bananas are also vulnerable to being blown over due to the weight of the stem of fruit. Thus, Propping should be done during the last few months of its life cycle before harvest.

Soil

Bananas need rich, moisture and well-drained soil with 40% clay, 75% silt, 85% loam. Bananas prefer a more acidic soil with pH between 6-7.5. Low pH soil makes banana more susceptible to Panama disease. Avoid soil that is sandy, salty, nutritionally deficient and ill-drained soil. If soil is not in the most favorable condition, improve it! Light sandy soil can be improved by placing mulch around the Banana plants. This will improve water retention and prevent nutrients from percolating quickly into the soil. Nutritionally deficient soil can be improved by incorporating organic matter to the soil before you plant your Bananas and then mulch them thickly. This process should be repeated as often as possible. Bananas do not tolerate waterlogging because its roots will rot. This however can be resolved by planting the Bananas in raised beds.



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2. Varieties

Varieties

Bananas come in many varieties, therefore selection of the species should be based on its demand and yields. The most commonly cultivated Bananas in Malaysia are Berangan and Cavendish and the remaining popular cultivars are Emas, Rastali, Raja Awak, Abu, Nangka and Tanduk. The schedule below shows the characteristic of the different varieties. With this information, you will be able to choose the species most suitable for your plantation.

Bananas varieties	Weight (kg)			Planting to Flowering (months)		Flowering to Harvest (months)
	Suckers	Tissue Culture	Optimal	Suckers	Tissue Culture	
Dessert						
Berangan	10 – 15	12 – 18	25 – 36	10 – 12	7 – 8	11 – 12
Cavendish (Novaria)	-	20 – 25	30 – 40	10 – 12	6 – 7	10 – 12

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3. Planting

Planting Material

The best way is to start with tissue culture plantlets. Tissue culture plantlets are recommended for planting because suckers, in general, are infected with some soil-borne pathogen and nematodes.

Tissue culture plantlets are healthy, pest and disease free, uniform and shorter harvesting period. Suckers on the contrary are not uniform and have a rather longer-harvesting period thus management of the plantation can be somewhat wearisome.

Planting Time

Tissue culture Bananas can be planted throughout the year.

Nutrients Required By Bananas

Bananas need nitrogen, phosphorus, potassium with a ratio of 3:1:6 and other micronutrients to ensure the plants grow vigorously.

Crop Geometry

The most economical and efficient spacing is 1.82m x 1.52m with 3,630 plants per hectare (a wide spacing of 1.82 m between rows). The diagram below provides a good indication of how the plants should be planted: -



However, the above spacing is only possible with fertigation. Bananas can be planted with higher density at 1.5m x 1.5 m but yields are poor due to competition for sunlight. The recommended spacing is at 2.0m x 2.5m with 2,000 plants per hectare since that is the standard distance to minimize Sigatoka.

Planting Method

20% of perlite should be mixed with the soil for optimal growth. Depending on the soil quality, one must apply the appropriate method as well as the depth and spacing at which plants are required to be planted.

Step 1: Mark the spots where the plants will be planted. Avoid marking and planting as you go because any oversight may lead to uneven spread of the Bananas. The best method to avoid this from happening is to use a long measuring tape.

Step 2: Dig a hole with a foot in diameter and ten (10) to twelve (12) inches deep and place the plants in the hole keeping the pseudo-stem 1 inch below the ground level.

Step 3: Toss a small amount of fertilizer into the hole to boost the growth of the plant and fill the hole with soil. Soil around the plant should be tramped down firmly to remove air pockets.

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4. Maintenance

Fertilising



A complete fertilizer with a ratio of 3:1:6 of nitrogen, phosphorus, potassium is generally suitable for most Banana plantation. The first application of fertilizer at the rate of 100 grams per plant can be made as soon as the plant begins to grow. Subsequent application of fertilizer should be applied as frequent as possible i.e. once every week if possible. The best approach is to apply smaller quantity of fertilizer but more frequently. For better taste and quality, try applying only organic fertilizers. It is advisable to water and fertilize at the same time to help Bananas grow. If water system is not available (i.e. fertigation or pipes), the best time for application of fertilizer is after rain.

Important note: Apply fertilizer one (1) inch away from the leaf and not

directly on the stem of the plant for best result. It is known that Banana roots grow approximately an inch everyday (at an optimal growth). On sloping terrain, apply fertilizer only on the up hill side.

Mulch

Mulch is primarily used to modify the effects of the local climate. A wide variety of natural and synthetic materials are used. The most easily available and cheaper material would be saw dust. It is best applied when the plants are still young to encourage faster growth. The benefit of using mulch is that it conserves soil moisture (blocking evaporation of water from the soil) and keeps soil cool as they block direct sunlight exposure. It also slows down the growth of weeds as it blocks the weeds from receiving sunlight thus minimizing labor work.

The mulch should be kept at least 50 cm from the base of the plant as it generates heat when decomposing. This practice is known to reduce fungal diseases while improving soil texture and adding nutrients to the soil. Generally, mulch is only required to be applied once as mature plantation is self mulching i.e. dead Banana leaves and trunks are removed and left behind as naturally mulch.

Weeding

Keep the plantation weed free. Banana plants grow notably slower with the presence of weeds because partial of the water and nutrients are absorbed by the weeds. Five (5) or six (6) manual weeding should suffice after which the growth of weeds is rather impossible when Banana plants reached mature size. Alternatively, mulching is advisable to reduce the growth of weed.

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5. Water Management

Water Management – Fertigation

Bananas require a great deal of water to grow. Traditionally, farmers provide nutrients to the plants by applying fertilizer in the form of pellets. Whilst it is less expensive, it is labor intensive and ineffective as nutrients may leach or evaporate after application. The most efficient manner in water management is drip irrigation. Drip irrigation coupled with application of mulch has proven to improve water efficiency with saving of 56% of water and increase yield by 20 – 30%. Moreover, distribution of nutrients is uniform under fertigation.



Generally, Bananas require a minimum of 2000 – 2500 mm annually or 25 mm per week. Deep watering is necessary during draught to help leach the soil of salt. It is common that Banana plants do not bear fruit if it lack of water. Whilst Bananas require large amount of water; do not over water them. Excessive water will cause roots to rot – Banana roots are poor withdrawal of water.

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6. Intercrop

Intercrop

Intercropping can be profitable. Short durational crops (45-60 days) can be planted between rows of plants. However, intercropping is only possible during early stage of the plantation.

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7. Special Operations

Special Operations

The following practices would directly affect the productivity and quality of the Banana plants.

i) Desuckering / Pruning

One mother plant and two followers. Keeping too many sucking plants will reduce yields. It is advisable to remove all suckers once the desired followers have been selected. An age interval of 2 months between the mother plant and subsequently each of the followers is most desirable as these followers will become your main stem after the mother plant fruits. The most effective method to permanently remove unwanted suckers is to cut the stem off the ground and then cut into the centre of the plant. This should kill the sucker.

ii) Propagation

The alternative of pruning is propagation of bananas. Instead of destroying the suckers, suckers can be removed from the clump and replanting it in a newly cultivated land. Large suckers called the "sword sucker" are the preferred planting material. When removing the suckers, it must be cut into the mother plant enough to unearth some roots.

Leaves are often removed in the process for easy transportation and re-planting. These suckers must be re-planted within a day or two and should not be exposed to the sun. Otherwise the roots may dry up.

iii) Deflowering

Remove the "Bell" (the purple flower petals at the end of the bunch – also known as "*banana blossom*" or "*banana heart*"). This is generally practiced because this way, Banana plant will conserve its energy into growing bigger bunch and not longer stalk.

iv) Pruning of leaves

Old leaves and infected leaves should be pruned regularly. This will reduce the likelihood of leaf diseases and keeps the plantation tidy. Furthermore, it provides natural mulch to the Banana plants.

v) Earthing up

Soil level should be raised after 3 months of planting to keep soil loose. This will also help prevent Banana plants from falling due to severe wind.

vi) Removal of female hands

Remove the last one (1) to two (2) hands of the bunch. Banana growers often remove the bottom female hands so that the remaining hands grow bigger as it facilitates fruit development and increases bunch weigh.

vii) Bunch Covering

Bunch covering increases the weigh and enhances quality of fruit. Traditionally, Banana growers protect the bunch from sunburn by placing dry leaves on the top hand of the bunch but this is not practical during rainy season and can be time consuming. Commercial growers however, use blue plastic sleeves. This practice is to protect Banans from insects, sunburn, diseases, spray residue, dust and birds. Covering the Banana bunch increases the temperature within which helps in early maturity.

viii) Propping

Support Banana plants with bamboos. Banana plants often go off balance due to the heavy weight of the bunch.

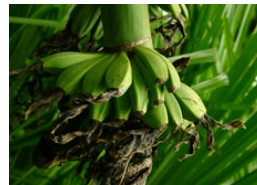
Therefore, two (2) bamboos should be propped by placing one (1) against the top of the bunch and the other against the stem on the leaning side. Propping using only one (1) bamboo is not advisable as the Banana plant may plunge to the other direction during strong wind.

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8. Pest and Disease Management

Pest and disease management

Bananas are prompt to viral diseases, fungal diseases and pest thereby reduces production, quality and yield. The following table shows the major pest and diseases that Banana growers should be wary of.



Pest	Viral Diseases	Fungal Diseases
Aphids (<i>Pentalonia nigronervosa</i>)	Banana Bunchy Top Virus	Head rot (<i>Erwinia carotovora</i>)
Fruit scarring beetle (<i>Besilepta subcostatum</i>)	Banana Bract Mosaic Virus	Panama wilt (<i>Furarium oxysporium</i>)
Nematodes	Banana Mosaic Virus	Sigatoka leaf spot (<i>Mycospharella</i> spp)
Pseudostem weevil (<i>Odaiporous longicolis</i>)	Banana Streak Virus	-
Rhizome weevil (<i>Cosmopolites Sordidus</i>)	-	-
Thrips (<i>Chaetanaphotrips & signipennis & Heliothrips kodaliphilus</i>)	-	-

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9. Harvesting

Harvesting



Harvest when fingers are fairly rounded. General practice



is to harvest when fingers of second hand are $\frac{3}{4}$ rounded. Alternative, for tree-ripened fruit, cut only those hands that are ripen and leave the remaining for other day. These Bananas taste the best. However, this process is time consuming and not feasible. The mother plant should be cut off after harvest as the plant can never produce again.

It is advisable to place harvested bunch in well padded basket before transporting to the collection site because Bananas are easily bruised and this will inevitably reduce the quality of the fruit. Once harvested, the bunch should be kept out of light, in cool and shady place. The process of ripening can be accelerated by covering the bunch with plastic sleeve together with a ripe fruit as it releases small amount of heat and ethylene which helps initiate and stimulate ripening. Depending on the demand of the market, hands are often cut into units of 6 – 15 fingers or left on stalks and sold to retailers.

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10. Storage

Storage

Keep Bananas refrigerated. The ripening process can be delayed if you refrigerate it. The skin of the fruit will turn dark but the flesh remains firm. Conversely, do not store Bananas below 13°C as it will stop its ripening process (at that temperature Bananas do not emit heat or ethylene).



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11. Post Harvest Handling

Post harvest handling

For export market, Bananas bunch are usually dehanded and soaked in sodium hypochlorite solution to remove the latex and treated with thiobendasole. Both sodium hypochlorite and thiobendasole are chemical compound or commonly known as bleach.

Note: Banana Planters has a strict policy of not using harmful chemical in the production process. Whilst the Banana skin may look grimy, it's safer to consume.

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