**PROCEDURE FOR GROWING GINGER IN POTS/SOILLESS MEDIA SUITABLE FOR PRODUCING SEEDS FOR PROPAGATION AND CONSUMPTION**

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**INTRODUCTION:**

Demand for edible ginger (*Zingiber officinale*) in the US and elsewhere has increased dramatically in the last decade. The recent growth in demand has been driven by increased awareness of the potential health benefits of ginger consumption, which are attributed to a group of compounds called gingerol. Ginger (Figure 1) is also among the healthiest and most sought spice on the planet. It is loaded with nutrients and bioactive compounds that have powerful benefits to the human body and brain.

**Figure 1**: Ginger harvested from growing in pots/soilless media in 2025.

Many documented health benefits from consuming ginger have been reported, including:
1) Ginger contains gingerol, a substance with powerful medicinal properties,
2) Ginger can treat many forms of nausea, especially morning sickness,
3) The anti-inflammatory effects can help with Osteoarthritis,
4) Ginger can help to treat chronic indigestion issues,
5) Ginger contains a substance that may help prevent cancer,
6) Ginger may reduce muscle pain and soreness,
7) Ginger powder may significantly reduce menstrual pain and lower blood sugars/cholesterol levels and improve heart disease risk factors,
8) Ginger may improve brain function and protect against Alzheimer's disease, and
9) The active ingredient in ginger can help fight infections. (Kuncha, et al., 2014).

Currently, Hawaii Island is the major producer of ginger in the state. Hawaii producers are uniquely positioned to supply the growing markets/demands for ginger. In order to increase production and to command premium prices necessary to offset higher production and shipping costs and maximize profitability, Hawaiian-grown ginger must be associated with exceptional quality (i.e. ginger color, ginger roots shape, and higher gingerol content, in addition to higher yield).

Bacterial wilt caused by *Ralstonia solanacearum* is the crop's most problematic disease. During 1992-93, an epidemic of this disease caused losses of ginger yield of more than 60% of the total crop, or 9 million pounds, resulting in a farm gate value loss of $5 million. Similar losses were recorded in various growing seasons since the early nineties. In recent years, Nigeria ginger farmers lost $7.57 million in 2023 due to the bacterial wilt (Agritech, 2024). Growing ginger in pots can prevent the infection if contaminated soil/soil solution are prevented from reaching the ginger growing pots (e.g. placing growing pots on raised benches and using clean soilless media (Figure 2). Growing ginger in pots is also suitable for orchard settings by placing benches and growing pots between the orchard trees. It is also suitable for food production in urban areas and edible landscape designs.

**Figure 2**: Ginger growing in various pot capacity (5, 7, and 10 gallon) placed on raised benches.

**MATERIALS FOR GROWING GINGER IN POTS**

**Growing Media:**

Coconut coir (Figure 3) or peatmoss can be used in growing the soilless ginger. However, based on our local trials in Hawaii, it is easier to clean coconut coir off ginger roots during the harvest process, compared to peat. Coconut coir is also a renewable media that can be composted and reused for the soilless ginger or growing other crops and purposes (e.g. compost). Coconut fruit husk can't be used directly, it needs to be washed well (to remove any salt content) and shredded as shown in Figure 2-right. Also, coconut coir blocks can be purchased and used.

**Figure 3**: Coconut coir husk, coconut coir blocks, and loose coconut coir, respectively.

**Fertilizer type:**

Slow-release fertilizer (organic or synthetic sources) can be used (Figure 4). No single organic fertilizer available can be used by itself to meet ginger growing needs, however, a combination of fertilizers can be used and is presented in Table (1). The recommended applications by fertilizer type, amount and monthly application were calculated for various pot size (Table 1). These recommendations can be scaled up or down (large or small pots) with a simple cross-multiplication.

**Figure 4**: Examples of Organic (Blood meal) and synthetic (Nutricote) fertilizers suitable for the soilless procedure.

**Fertilizer Application Schedule:**

**For Synthetic Fertilizers**

1st application: At Planting:

2nd application: 2 months after planting

3rd application: 3 months after planting

4th application: 4-5 months after planting.

**For Organic Fertilizers**

1st application: At Planting:

2nd application: 2 months after planting

3rd application: 3 months after planting

4th application: 4 months after planting.

5th application: 5 months after planting.

**Table 1**: Fertilizer Application for ginger in pots based on pot volume.

| **Pot size/Fertilizer type** | **7-gallon pot** | **10-gallon pot** | **15-gallon pot** |
|---|---|---|---|
| Synthetic Fertilizers* | | | |
| **Nutricote 13-13-13**** | Total of 227g | Total 325g | Total 488g |
| | At planting = 56g<br>At 2 months = 56g<br>At 3 months = 56g<br>4-5 months = 56 g | At planting = 82g<br>At 2 months = 82g<br>At 3 months = 82g<br>4-5 months = 82g | At planting = 122g<br>At 2 months = 122g<br>At 3 months = 122g<br>4-5 months = 122g |
| **Osmocote 13-13-13** | At planting = 56g<br>At 2 months = 56g<br>At 3 months = 56g<br>4-5 months = 56 g | At planting = 82g<br>At 2 months = 82g<br>At 3 months = 82g<br>4-5 months = 82g | At planting = 122g<br>At 2 months = 122g<br>At 3 months = 122g<br>4-5 months = 122g |
| Organic Fertilizers*** | **Each application** | **Each application** | **Each application** |
| **Sustane 4-6-4**<br>**Blood Meal 12-0-0**<br>**Potash 0-0-60** | Sustane = 98g<br>Blood Meal= 17g<br>Potash= 3g | Sustane = 140g<br>Blood Meal= 24g<br>Potash= 5g | Sustane = 210g<br>Blood Meal= 36g<br>Potash= 7g |
| | **Each application** | **Each application** | **Each application** |
| **Bone Meal 3-15-0**<br>**Blood Meal 12-0-0**<br>**Potash 0-0-60** | Bone Meal= 40g<br>Blood Meal= 40g<br>Potash= 10g | Bone Meal= 55g<br>Blood Meal= 55g<br>Potash= 14g | Bone Meal = 85g<br>Blood Meal= 85g<br>Potash= 21g |
| **Biochar** | for all fertilizer type | Apply at 2% by mass (~20g/kg media) | |

*Synthetic fertilizers are recommended for 4 applications.

**Nutricote has additional nutrients, including: Magnesium, Boron, Copper, and Manganese.

***For the fertilizers under the organic option: the amounts above are for each application and estimated for total of 5 applications.

**Pot Size and Type:**

Fabric or plastic pots can be used and both types have pros and cons. In general, all tested pots were suitable for growing ginger in soilless setup, but from experience, fabric pots were easier for harvest (emptying the pots/harvesting the ginger). On the other hand, plastic pots can be reused for longer period (considering pots cleaning/sanitation between plantings). As mentioned above, placing the growing pots on raised benches is needed to prevent water

splashes from the soil or exchange of soil-solution with the pots which could carry the bacteria that causes the bacterial wilt infection. Pot size and diameter were evaluated and the results showed that pots with larger diameter (shorter height) led to higher yield compared to smaller-diameter taller pots (Figure 5) with the same pot capacity. It might be related to the increased inner space given for the ginger to grow into.

**Figure 5**: Pot type and diameter difference for same capacity (10-gallon pots).

**Growing season**:
The growing season for growing in Hawaii is between March and May for planting and January to March the year after for harvesting, for a total of 10 month growing season. The harvested ginger can be used to start the next growing cycle.

**Media and Fertilizer Application:**
The growing season to start with an application of a thin layer (~2-3 inch) of coconut coir (or other media), then placing the ginger seeds (pieces) at the corner of the pots as shown in Figure (6). Pointing the growing tip of the ginger into the center of the pot. For a 10-gallon size pot, 2-3 ginger pieces placed at similar distance from each other are sufficient. The ginger pieces to be covered with another 2-3 inch of media then irrigate to ensure sufficient moisture. When the ginger pieces will start to germinate (note: it takes weeks, ginger pieces push roots first, then shoots. Using sprouted ginger pieces may speed up the process but not significantly). In about a week, the first fertilizer application is needed, in a month, time for additional media and 2$^{nd}$ fertilizer application (The amount of media based on the speed of growth, make sure not to cover the shoot/new leaves completely to allow for more growth). In about 2-months after planting, 3$^{rd}$ media and fertilizer application is due. 4$^{th}$ (if using synthetic fertilizer) and 5$^{th}$ (if using organic fertilizers) applications of media and fertilizer are a month apart from each other and after a month of the 3$^{rd}$ application. After the 4$^{th}$ or 5$^{th}$ application (based on fertilizer type), only media will be added monthly till the pot is almost full.

**Figure 6**: Ginger seeds (pieces) planting and media application overtime.

**Harvesting:**

Ginger harvested from each pot by emptying the pots and collecting the ginger (Figure 6). Growing media (coconut coir) gets collected for composting/reusing for future growing season.

**Figure 7**: Ginger pot emptied at harvest (left) and ginger cleaned from the pot (right).

**CONCLUSIONS:**

Ginger can be grown well in pots and using soilless media. The procedure is good for producing clean ginger for propagation and consumption. Coconut coir is a well-suited media to grow the ginger and easy to remove during the harvest. Also, the coconut coir used in growing the ginger was easy to collect, compost, and reuse to grow ginger or use as compost added to soil.