

USING HOT WATER TO TREAT YAM PLANTING MATERIAL (HEAD) WITH DRY ROT ("BURNING")¹



Figure 1: Hot water treatment of yam

Yam tubers are often affected by a dry rot in the skin. Jamaican farmers call this condition "burn" or "burning", and they give various explanations for its cause. These range from worms or insects, or the soil in which the yams were grown not being "trenched" properly, whatever that means. Some say that burning results when the soil is sour, too wet ("watery") or dry, too hot or cold ("chill"), too strong or "ha'sh" (they don't explain these terms adequately), or when too much fertilizers or other chemicals are used. Burning becomes more severe, it is said, when the soil becomes "light" or "loose" after overuse. One opinion was that burning is exacerbated by too much grass or trash put in the hill at planting, another that the time getting hot was the main factor. Some farmers say that yams "burn" because they are left in the ground too long, or because they are over-ripe, others that "burning" comes from the old mother head. In fact, all these opinions are wrong. Dry rot is a symptom of nematode damage.

Nematodes, a group of specialized worms, live almost everywhere. Some are PLANT PARASITES. Most plant-parasitic nematodes are very small (less than 1 mm long) and one must use a microscope to see them. Because they are not seen in the field is one reason why plant nematodes go unrecognized. Another is that the damage they cause is usually unspectacular, oftentimes appearing as poor growth without noticeable cause.

In Jamaica, yams are affected by at least six types of nematodes, two of which cause dry rotting which can and does affect yam production.

How Nematodes/Dry Rotting Affect Yam Production

Groups or bands of cells (called primordia) in the skin of the yam tuber develop into the yam plant. The nematodes live in the yam skin, feeding on the cells there. The chemicals which the nematodes produce during feeding cause death of the yam cells, leading to the dry rot. As the tubers are kept, the nematode populations increase and spread over and deeper into the yam skin. More cells are invaded and die, resulting in spread of the dry rot. This is why some farmers give "yams remaining in the ground for too long" or being "over-ripe" as the cause of burning. The more of the primordia that are invaded and succumb to the dry rot, the more unthrifty will be the plants that grow from such tubers. Unthrifty plants will not grow as well nor be as productive as plants growing from unaffected primordia; "weak" plants, low production. Tubers on which primordia are completely invaded and killed by the dry rot will not sprout when planted in the field; no plant, no production. This is why some farmers "over-compensate" by planting very large heads, unwittingly expecting that there will be viable skin on them. There is clear evidence that production of the

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white yam and the yampie has declined substantially because of severe nematode damage of planting materials.

If Yellow yam heads with extensive dry rotting were planted, less of these heads sprouted, plants from them were "weaker", and production was significantly lower than where heads with little dry rotting were planted; all of these sprouted and the plants were "stronger". Farmers are therefore advised to plant only those heads with little or no evidence of burning, and should never plant heads with extensive dry-rotting.

How to Prevent Severe Burning of Yam Planting Material

To prevent severe dry rotting of yam heads, one must suppress development and spread of populations of the nematodes in the yam skin. This can be achieved by dipping the heads in hot water, or in certain chemicals. It was found that dipping nematode-infested yellow, white or negro yam heads for 40 to 45 minutes in hot water (between 45 and 50°C) brought about suppression of populations of the nematodes that cause dry rot. This temperature was high enough to kill the nematodes but not injure the yams. Very few if any nematodes were recovered from yams dipped in the hot water, but high numbers remained in yams dipped in cool water. More of the hot water-dipped heads sprouted, and the sprouts were thriftier, compared with the other heads. In several trials, plants from yellow or negro yam heads dipped in hot water produced 10 to 40% greater weights of tubers compared with heads dipped in cool water. However, similar results have not been observed in trials with white or sweet yams.

How to Dip Yams in Hot Water

Simple but effective way of dipping 20 kg or so of yams at a time had been developed.

This method requires: -

- *three half 200- litre metal drums (Figure 1)*
- *two or three buckets, (Figure 1 & 2).*
- *a thermometer (Figure 2)*
- *two fires*
- *several clean fertilizer bags. Onion bags can be also used.*
- *sufficient water*
- *75 kg or more YAMS FOR DIPPING.*

TREATMENT PROCEDURES

- Two of the half drums, each about two-thirds full of water, are put on the fires (Figure 1). The water in DRUM 1 is heated to 47°C, while the water in DRUM 2 is heated near to boiling (hotter than the water in DRUM 1).
- Cool water is kept in DRUM 3 (Figure 2).
- The yams to be dipped are put in a fertilizer or onion bag and immersed into the water at 47°C in DRUM 1, on a cushion of fertilizer bags (Figure 3). The yams will soon absorb some heat and the temperature will drop nearer to or below 45°C. If

necessary, hotter water from DRUM 2 should be added slowly to DRUM 1 to bring the temperature up, to between 44 and 45°C. If the water temperature gets to over 45°C, cool water from DRUM 3 should be added to bring it back to between 44 and 45°C. It soon becomes very easy to keep the temperature steady by adding hotter or cool water, and regulating the fire which should be low at this point.

- The temperature should be checked every 5 minutes or so, making sure to push the thermometer among (not into though) the yams. The yams are taken out after 40 to 45 minutes (Figure 4).

More than one batch of yams may be dipped by having a third or fourth fire. **It is very important to keep the water temperature between 44 and 45°C and yams in it for the right length of time.** If the water does not get hot enough, nematodes will not be killed. If the water gets too hot, the yams may be injured, or killed.

Sunning yams will not kill nematodes.



Figure 2: Drums for cold & hot water & thermometer for temperature control



Figure 3: Place yam into bags. Place one fertilizer bag to the bottom of the drum



Figure 4: Immerse bag with yam into water. Check temperature of water every 5 minutes.

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