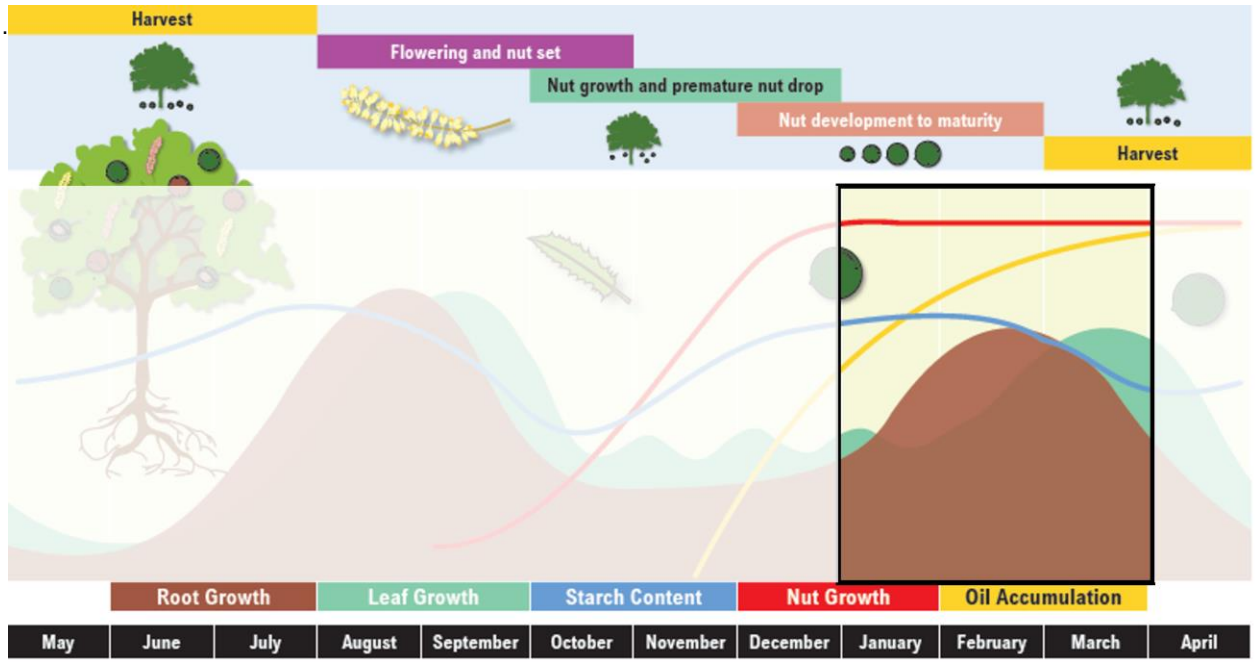
January to March in a nutshell

January to March is generally associated with shell hardening and oil accumulation as the nut develops to maturity. During this period, nut size does not increase significantly, and oil content increases during January and February and stabilizes from March onwards. Root growth starts to increase steadily in February, and typically peaks during late February and the beginning of March. A small leaf flush in early to mid-January is followed by a larger flush in the middle of March. Management is focussed on cleaning under trees in preparation of harvesting, ensuring logistics around harvesting is finalized (harvest equipment is clean, in working order and necessary spare parts are on-hand and seasonal workers available), and protecting nuts from damage by pests and diseases, especially stink bugs.



General orchard management

- During this period, a new root flush is produced, and fine feeder roots should be protected by mulching. Mulch will also counter weed growth, which reduces the amount of herbicide that will be needed.
- Continue with your irrigation and fertilization schedules as recommended by your technical advisor. Be mindful that irrigating with micro-sprinklers when there are nuts on the orchard floor can stimulate germination of the nuts.

Preparation for harvesting

- Ensure that you have enough containers and/or bags for the nuts.
- Remove any “old” and immature nuts from the orchard floor to ensure they are not mixed with the current seasons’ nuts. This is especially important in orchards with nut borer infestations. These “old” nuts can introduce fungi and insects to “new”, healthy nuts, and can lower the peroxide value and shelf life of “new” nuts if mixed.
- Do not disturb the composted mulch, only remove rough organic material that can conceal nuts on the orchard floor. Leaves under Beaumont trees which will be subject to ethephon treatment should not be removed.
- In bearing orchards weeds are removed as this hamper harvesting, and herbicides can be used to control regrowth.

Harvesting

- Perform maturity tests before stripping cultivars, especially those that do not drop their nuts naturally.
- Mature nuts should not remain on the orchard floor for more than two weeks, thus harvest nuts every week, or at least every second week. If ethephon is used, nuts can be harvested as soon as they drop to the ground. Aim to harvest nuts while the husks are still green.
- Ensure that you harvest at a rate that ensures that the capacity of drying bins are not exceeded.
- Limit the number of nuts that remain in the orchards after every round of harvesting as this will ensure that quality remains high, and prevent nuts serving as reservoirs for fungi and insects.
- Harvested nuts should be de-husked as soon as possible, preferably on the same day. Harvested nuts should not be kept in plastic bags for more than 12 hours, and preferably in the shade.

Pests and Diseases

- From February onwards, the population numbers of natural enemies increase, so attention should be paid to use softer chemicals during this time. Pesticides with a narrow spectrum or a short residual action should preferably be used as it will provide existing natural enemies with the best opportunity to regulate populations of pests, especially those of stink bugs. Examples include registered products containing various insect pathogens such as *Beauveria bassiana*. UV intensity should also gradually decrease towards autumn which will decrease the environmental ephemerality of these insecticides.

Thrips

Scouting protocol

- For thrips, monitor by using the "beating method": Terminal branches containing new leaf flush should be tapped at least five times on a black A4 paper to dislodge and count the thrips. Thrips are widely regarded as repercussion or secondary pests. Use an integrated approach and do not aggravate the problem by simply spraying more chemicals. Be careful about certain organophosphates and synthetic pyrethroids during this time as resistance is suspected.
- Citrus thrips, the main thrip pest of macadamias in South Africa prefer to feed on new vegetative flushes. When the growth tips are monitored, ensure that only new flush is therefore selected. This method is suggested to gather data that is comparable between successive weeks and seasons.
- Monitor 10 terminal branches with the A4 beating sheet for each data tree in each block.

Stink bugs

Scouting protocol

- Randomly select data trees the previous afternoon and place the plastic sheeting out, covering at least 80% of the drip zone. Anchor corners of sheets with rocks or pegs to ensure that the sheet is not blown away by the wind.
- Spray early in the morning before sunrise or when temperatures are still lower than 18°C.
- Keep the time after the spray to the collection of the bugs constant so that insect populations can be properly compared between successive weekly monitoring intervals. Practically an hour is recommended.
- Collect all bugs (immature & mature) and differentiate between coconut bugs, short mouth and long mouth bugs.

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- Please note that Dichlorvos is no longer registered for monitoring in macadamias. No new products have so far been registered and it is suggested to use one of the registered contact insecticides instead. The knock down ability of these products should not be as good as Dichlorvos. Growers are therefore cautioned to make provision for this during their weekly scouting sessions.
- Nuts become very attractive for stink bugs during the oil accumulation phase and remain attractive up to early winter (mid-June).
- Monitor maturity and if an orchard is mature, harvest as soon as possible as the two-spotted stink bug can penetrate the hard shell and feed on the kernel prior to harvest.
- Record all egg packets on the main stems of each data tree and indicate if they are parasitized (black) or alive (white).
- Threshold: Average of 0.4 stink bugs per tree over 10 trees.

Nut Borers

- From mid January onwards, larvae feeding inside the husk sever vascular bundles connecting the nut to the tree. These nuts will drop prematurely (Jan–Feb) and should be floated to quantify maturity before delivery to the factory. This is important if the orchard has a history of moth infestation or in the case of known susceptible cultivars (816, 788 and most hybrids except Beaumont and 791).
- During late Jan/Feb many macadamia nut borer and false codling moth larvae will be present in prematurely aborted nuts of susceptible cultivars. A corrective spray during this time will not be cost effective because:
  - Registered pesticides are only effective against the egg but especially recently hatched larvae.
  - Unless a well-timed directed spray occurred during the oviposition peak in early December egg laying during this period is no longer synchronised, and generations overlap to a large degree.
  - Contact chemicals cannot kill larvae once they are feeding inside the husks.
- Delta traps is currently recommended for monitoring
  - Macadamia nut borer: 7 moths/trap/week.
  - False codling moth: 10 moths/trap/week.
- Additionally, it is suggested to examine at least 20 nuts/data tree for eggs, holes, frass and husk rot infection.
- During this time no or very little nut abortion should occur. Count all aborted nuts under each data tree and record it on the scouting sheet or on the hand-held device.

Felted coccid and bark borer beetles

- Felted coccid and bark borer beetle numbers should increase from the end of January. Be vigilant for possible infestations, especially in the Barberton/Nelspruit/White River areas.

Diseases

- Phytophthora: the presence of stem cankers (vertical bark cracks and gumming) and dieback are indicative of Phytophthora infections.
- Record significant dieback of twigs and branches.

Growers should always use registered plant protection products and be mindful of preharvest intervals (PHI's) and maximum residue limits (MRL's). Although tree phenology is linked to the calendar, it is important to remember that tree phenology is determined by climatic factors, thus some variation in the timing can be expected.