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FRuiTROP

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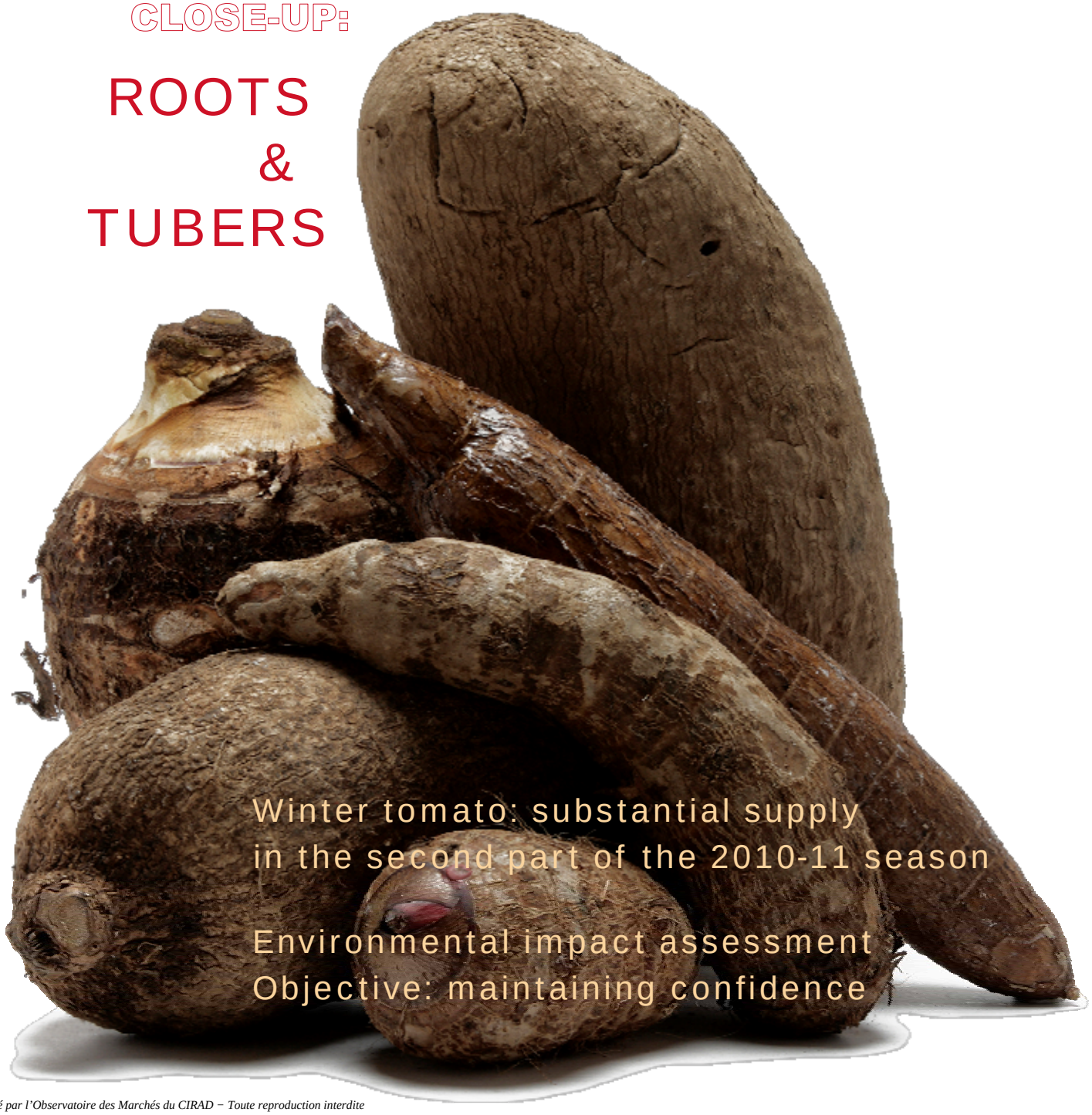
CLOSE-UP:

ROOTS & TUBERS



Winter tomato: substantial supply in the second part of the 2010-11 season

Environmental impact assessment
Objective: maintaining confidence

http://passionfruit.cirad.fr

Tropical roots and tubers

General characteristics

by Philippe Vernier

Root and tuber plants have the common feature of being grown for their underground parts and reproduced by means of cuttings. Production focuses on underground storage organs (roots or tubers) and not on seeds following the fertilisation of flowers as in grain crops for example. The fact that the crop is not dependent on fertilisation makes production more stable and less affected by meteorological events. Pollination is always a sensitive period and water stress can compromise the harvest irremediably at this stage. Root and tuber production is a continuous process. A water shortage at one period in the cycle will certainly slow the accumulation of reserves but will not halt it definitively as the process will resume when it rains again. Finally, except during a period of total, prolonged drought, there will always be a crop whereas drought lasting a few weeks at the wrong time will wipe out a grain crop. This is how the introduction of the potato in Europe in the seventeenth century made it possible to overcome the problem of the recurrent famines that occurred in Europe.

Vegetative multiplication leads to identical reproduction (cloning) of plants that remain genetically identical as seasons go by, except in the case of somatic mutation, a rare phenomenon. This means that it is easy to conserve the characteristics of each variety without risk of the degeneration that can occur in grain plants where a variety can easily drift if it is contaminated by foreign pollen. The risk is great in cross-pollinated plants (separate female and male flowers) and a complex seed production system is needed to guarantee varietal purity (maize). This risk does not exist for root and tuber plants but the situation is not completely wonderful as other constraints are involved in vegetative multiplication.

In return for this genetic stability, adaptation in case of changes in the environment (the appearance of new diseases, climate change) means that sexual reproduction must be used to breed new, better adapted varieties. As the plants concerned have often lost their natural fertility, the procedure is more complicated than for grain plants.

A cutting is a plant fragment with a high moisture content and therefore perishable, bulky and heavy and also more difficult to store and transport. In contrast, seeds are small, have a low moisture content and can easily be stored for several years. The type of cutting used for planting varies according to the species concerned.

The other problem involved in vegetative multiplication is the much greater biological pest load. Seeds do not spread viruses much but cuttings do. Likewise, this type of planting material can easily carry all kinds of pests (nematodes, fungi, insects, etc.) and is more complicated to treat than seeds because of its bulk and perishability.

Yam (*D. alata*) Nordeste Brazil

Cassava

Sweet potato

Tannia (*Xanthosoma sagittifolium*) or macabo in Cameroon

Photos© Philippe Vernier

Tropical roots and tubers — Taking and storing cuttings			
Species	**Type of cutting**	**Storage**	**Observations**
Cassava 	20 to 40 cm stem fragment	Ligneous stem cuttings, good resistance. Several weeks under dry conditions in the dark.	Production and harvesting all the year round. No competition with root production .
Sweet potato 	Green stem cuttings with 2 or 3 leaves.	Green stems. Low resistance. A few days with good protection.	No competition with tuber production. Continuous cycles needed (3 or 4 per year). In countries with cold winters (USA), seeds are stored and germinated in seedbeds for producing cuttings.
Taro: **cocoyam and tannia**	Corm tops (dasheen), secondary corms (dasheen, tannia) or small tubers (eddoe).	Short for corm tops, several weeks for tubers; 1.5 to 3 tonnes of cuttings per ha.	Partial competition with production. The removal of corm tops makes corms for consumption fragile.
Yam	Pieces of tuber, small tubers (200 to 500 g).	Storage for 1 to 6 months is possible, even if germination starts (if shoots are removed). 	1 to 5 t/ha, up to a third of production. Strong competition with production. Investment in cuttings is expensive. The germination of pieces of tubers is strongly staggered in time (heterogeneous sprouting).

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