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### ► **To cite this version:**

Marie Odile M. O. Jordan, André Lacoïnte, Philippe P. Vivin. C and N storage in fruit trees and vines: functions, location, and regulation of their seasonal dynamics. Les réserves végétales et leur importance agronomique et sylvicole, Jun 2009, Caen, France. 2 p. hal-00964797

**HAL Id: hal-00964797**

**<https://hal.science/hal-00964797>**

Submitted on 6 Jun 2020

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**" Les réserves végétales et leur importance agronomique et sylvicole "**  
**Université de Caen Basse-Normandie**  
**9 et 10 Juin 2009**

**« C and N Storage in Fruit Trees and Vines: Functions, Location, and Regulation of their Seasonal Dynamics »**

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Résumé en anglais (maximum 2750 caractères espaces compris) :

Three main functions were identified in fruit trees for the C (carbon) and N (nitrogen) stores: (i) Short term storage buffers the daily variations and allows growth resumption after organ ablation (pruning or pest disease). (ii) Long term storage is needed to sustain plant survival in winter and early spring growth. (iii) Safety C stores could also be constituted at the expenses of plant growth as a response to an important and lasting stress.

Both C and N stores are not evenly distributed within the trees. Roots represent the main storage organ. Above ground there are clear concentration gradients of TNC (Total Non structural Carbon) and N from plant base to top ; The youngest shoots being the richest. That is also observed in trunk wood, where storage occurs preferentially in the youngest rings. In the crown, the N and TNC concentrations of equivalent axes (size, order and age) varies moreover with their position, being the highest in short secondary axes inserted on the base or the middle of the trunk. Concentrations increase also along the stems, being the highest in the terminal parts.

The seasonal dynamics of storage and mobilisation are not synchronized among the plant organs. For instance, N mobilisation in spring is delayed and less severe in the young shoots than in the older ones. For starch, accumulation starts in the growing shoots while mobilisation still continues in the trunks and roots. Regulation of both storage and mobilisation processes, depend first on tree N status, age and condition, and second on culture practices.

- tree N-status, estimated by leaf N concentration determined (i) N uptake and allocation in late fall, (ii) mobilisation of leaf N prior to fall, (ii) shoot/root ratio at leaf fall, and (iii) TNC accumulation. The N stores are almost totally mobilised the following spring to ensure early growth. That is not the case for TNC. The restoration of root activity and early spring shoot development depend on N mobilisation, not on soil N availability. Growth is affected basically by the number and the position of proleptic axes, not by individual axes growth. That modifies not only tree size but also tree shape.

- tree phenology, namely fruit yield potential and precocity also affects C and N storage and mobilisation patterns. Thus, fruit represent an important carbon sink, in competition with N uptake (strongly dependent on the C flux toward the roots), which could even mobilise stored

TNC. Storage became usually significant only after harvest. Spring mobilisation also is modulated according to plant needs for reproductive growth.

- organ ablation (pruning or defoliation) is a common culture practice that affects storage, by removal of C source organs when applied during the growing season, or losses of large amounts of C and N for winter pruning. It could induce (i) a depletion of TNC becoming more severe every year, (ii) a redistribution of the C stores within the trees in favour of the roots, (iii) a differentiation of specific storage organs in the proximity of the pruning cuts, (iv) promote axillary buds development to restore leaf area.