



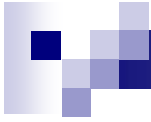
PLS 597-006
Lecture 9

Reserves of the Grapevine
Flowering and Fruiting



Reserves of the Grapevine

- Carbohydrates and mineral nutrients are stored as reserves within the grapevine
- Reserve carbohydrates are utilized in the absence of recently formed Pn
 - During the night
 - After leaves have fallen



- Elements such as N and K
 - Remobilized from storage organs
 - Before appreciable mineral nutrient uptake



Carbohydrate Reserves

- Primary source of CHO
 - Recently formed starch
 - Soluble sugars formed during daylight hours
- [Starch] varies on a diurnal basis
 - Highest before sunset
 - Lowest sunrise

SS and Starch(g/vine) in Chenin blanc

	19 March		27 May		25 July		20 September	
	SS	Starch	SS	Starch	SS	Starch	SS	Starch
Roots	19	322	27	409	39	595	39	928
Trunks	22	184	15	173	21	302	19	404
Cordons	26	225	21	155	22	258	28	366
Stem			55	3	38	31	80	76
Leaves			44	<1	81	<1	84	7
Clusters			5	<1	589	16	2496	7



Utilization of CHO reserves

- Stored in permanent structures of the vine
- Necessity in early season growth
 - Fixed growth
- Unlike fruit trees
 - Grapes flower after considerable shoot growth has occurred



- From BB to 2 wk ANTH
 - 95 g of NSC were lost from trunks and cordons
 - 95 g increase in root NSC in the same period
- NSC continues to increase in perennial parts until harvest
 - NSC 2.7 x higher in roots
 - NSC 1.8 x higher in trunks
 - NSC 1.5 x higher in cordons
- NSC lower at BB



- NSC is used for respiration during dormancy
- Sugars increase in canes post-harvest
 - Elevated solute content protection mechanism for lower winter temperatures




Mineral Nutrient Reserves

- Nitrogen is the important reserve
 - Stored in the form of arginine
 - Utilized during new shoot growth
 - Arginine in the roots is the main source



- Loss of N from the root system
 - 40% of the total N from the whole vine
 - Used in new shoot growth
- Only 14% to 26% of the N from trunks and cordons for new shoot growth

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- Field grown Chenin blanc
 - 10 g/vine of N
 - BB and ANT from perennial parts
 - What does this mean?
 - Patsy?



- This means

- Less than 15% of the N required by new shoots and fruit
- During fixed growth



- In field grown Sultana

- 15 g/vine N utilized from perennial parts of the vine
- Between BB and ANT
- Representing 70% of the N requirements of the shoots

- What does this mean?


- Patsy?



- The amount of N in the root system continues to decrease until harvest
- Starts to increase towards harvest
- Roots are able to supply the rest of the vine with N taken up from the soil
 - Even in early growing season



- Using labeled N
 - N accumulated in the fruit
 - Primarily derived from N stored in the roots and mature wood

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- Amount of N remobilized
 - From roots, trunk and cordons
 - Is dependent on
 - Vine age
 - Time of the year
 - Growing conditions



Potassium (K)

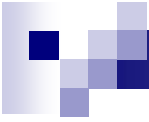
- Distribution of K different than N within the vine
- Absolute amount of K $<$ absolute amount of N in the roots
- Amount of K in trunks and cordons $>$ N in trunks and cordons



- Very little K stored in roots of grapevines
- Very little K is mobilized from roots of grapevines
- No K is mobilized from trunks and cordons to other organs
- Fruit is the major sink for K



- Remobilization of K
 - Occurs from the leaves to the berry
 - K in berry increases if canopy is dense
 - Affecting fruit composition



N and K (g/vine) of Chenin blanc

	19 March		27 May		25 July		20 Sep	
	N	K	N	K	N	K	N	K
Roots	90	26	80	21	63	22	68	26
Trunks	15	26	15	37	21	26	21	33
Cordons	23	22	25	36	27	26	28	32
Stem			9	24	35	31	32	44
Leaf			44	20	37	36	32	29
Cluster			11	21	23	48	37	88



Nutritional Aspects of Leaf Senescence and Abscission

- Recovery of
 - Mineral nutrients
 - Carbohydrates by permanent structures
- Shedding of leaves occur when abscission zone in the leaf and the petiole are activated



- In perennial crops

- Large portion of the total N is remobilized into the perennial parts (e.g. apple)

- Do grapes behave in similar fashion?

- Patsy?



- In grapes

- Large [N] in leaves
- < 5 g/vine of N from leaves translocated back to perennial portions
- 30 g/vine of N of remains in the leaf and falls to the ground
- 33 kg/ha of actual N



K in the leaves

- Most K removed by harvest
- Little remains in the leaf for stomatal aperture
- Once leaves shed
 - 7 kg/ha of K is lost from the vine



Take home message

- Senescence is of little significance
 - To maintain internal levels of nutrients
- Mineral nutrients of leaves, prunings in the vineyard floor
 - Once decomposed do become available to the vine in following years