

# Tree Phenology and Leaf Mineral Content in Mexican Plum under Rain-fed Conditions

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*Improved nutrient management and monitoring of concentrations could help improve fertilizer application rates and timing for Mexican plum orchards.*

Mexican plum leaf and fruit at varying degrees of maturity.



Mexican plum (*Spondias purpurea* L.), also called Spanish plum, red mombin or Ciruela, is a tropical tree of the Anacardiaceae family. In Mexico, this species provides an important source of income to many small growers in the states of Jalisco, Nayarit, Puebla, Sinaloa, Chiapas, and Yucatan. The fruit is usually consumed directly from the tree, but it is also appreciated in the ice cream and flavoring industry when dehydrated. Very little information is available on the nutritional requirement, preferred growing conditions, and special growing habit of the tree. Therefore, nutritional and physiological studies are considered quite timely. This study reports the phenology and nutritional status of

a rain-fed Mexican plum orchard throughout an annual cycle.

In contrast to most tropical and subtropical fruit trees, Mexican plum undergoes defoliation

Figure 1. Mexican plum tree phenology and climatic data over the annual cycle in Jicote, Nayarit, Mexico (measurements averaged over two years).

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Flowering		Fruit harvest		Harvest		Vegetative growth		Root growth		Floral differentiation	
	Dormancy								Defoliation		Dormancy	
Temp (°C)	22	23	24	24	28	30	29	28	28	28	27	25
Rain (mm)	0	0	0	0	0	21	330	355	274	19	35	36

Table 1. Comparison between established N, P, K, Ca and Mg leaf concentration levels of stone fruit trees<sup>1</sup> and nutrient levels of Mexican plum leaves measured in September.

	Nutrients (% dry weight)				
	N	P	K	Ca	Mg
Stone fruit trees <sup>1</sup>	2.0 - 3.5	0.14 - 0.25	1.1 - 3.5	1.4 - 4.0	0.25 - 0.80
<i>S. purpurea</i> <sup>2</sup>	2.39	0.10	0.70	1.48	0.27

<sup>1</sup>Based on adequate levels of stone fruit trees (Robinson 1986).

<sup>2</sup>Average nutrient concentrations found in Mexican plum during the September 19th sampling.

tion in the fall and dormancy during most of the winter season. Flowering and fruiting occur when trees are defoliated. In this study, the first sign of new vegetative growth was detected in May during the start of fruit harvesting (Figures 1 and 2). During this vegetative stage, leaf growth, expressed both as dry matter and leaf length, showed a double sigmoid curve (Figure 3). Vegetative growth ceased by October, which brought the first symptoms of leaf senescence and subsequent tree dormancy.

Leaf growth and foliar content of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg) were determined in the Mexican plum leaf dry matter at monthly intervals (Figure 4).

Concentrations of N, P, K, and Mg decreased with leaf age until leaf growth finished in September. Leaf Ca concentration increased during the same time period. The various sampling times and nutrient concentrations suggest fertilization calculations and nutrient diagnostics would be most successful when based on leaf analysis of samples taken in September. Tree nutritional status obtained in September was compared to each sampling time as well as nutritional standards considered optimal for stone fruit trees (Table 1). Results suggest adequate N, Ca, and Mg levels were present, but P and K were below optimum throughout May to October. It is apparent that increased P and K fertilization is an important part of improving yield and fruit quality of commercial Mexican plum orchards. Time of application and amount of P and K fertilizers are factors that limit fruit productivity and profit and require detailed study. **BCI**

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## Literature Cited

Robinson, J.B. 1986. Fruits, vines and nuts. In: Reuter, D.J. and J.B. Robinson (eds). Plant Analysis, an Interpretation Manual. Inkata Press. pp. 120-147.

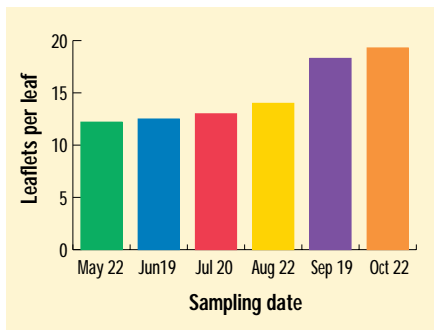


Figure 2. Leaflet production in leaves of Mexican plum over the vegetative growth period.

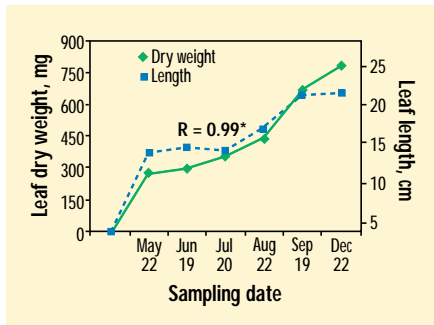


Figure 3. Leaf growth and dry matter accumulation in Mexican plum.

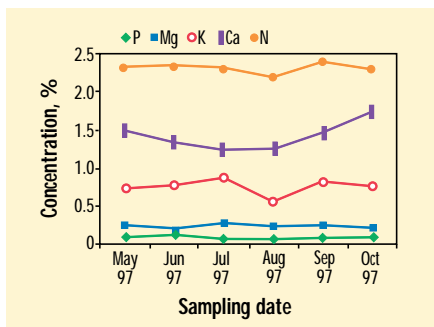


Figure 4. Foliar nutrient dynamics in Mexican plum.