

# Grapevine nitrogen status : Interpretation thresholds for chlorophyll index

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## Nitrogen deficiency and chlorophyll index

Green leaf color correlates well with chlorophyll content and with leaf yellowing symptoms related to nitrogen deficiency (**Figure 1**). Estimating chlorophyll concentration in leaves provides a reliable assessment of the nitrogen nutrition status of the vine during the season.

The N-tester and the SPAD 502 are two commercially available chlorophyllmeters that use different scales (**Figure 2**). Interpretation thresholds are required for the assessment of the nitrogen status of the plant.



Figure 1. Symptoms of nitrogen deficiency : poor shoot growth and pale green-yellow coloration of the foliage. Phenological stage of flowering, chasselas.

## Interpretation thresholds to assess nitrogen status

Spring and Jelmini (2002) proposed interpretation thresholds for the N-tester index at the phenological stage veraison (BBCH 85). In 2022, 500 measurements were made in parallel with the two chlorophyllmeters N-tester and SPAD 502, in order to establish a correlation allowing practitioners a simple conversion between the two indices and to propose thresholds for the SPAD index (**Table 1**).

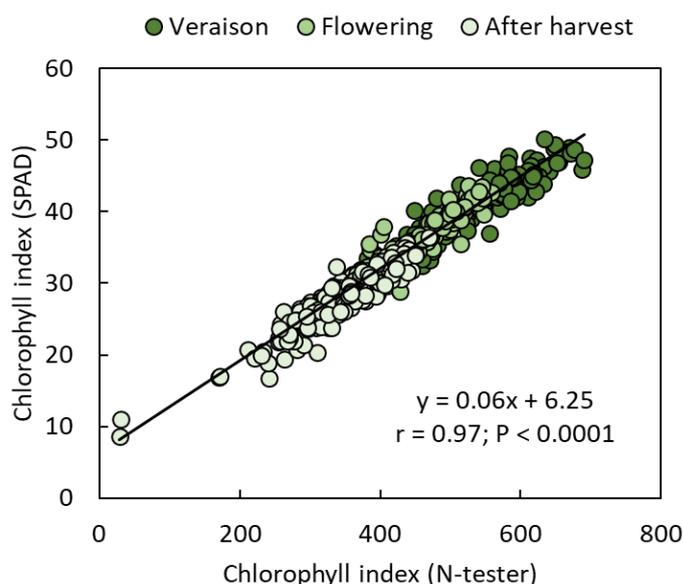


Figure 2. Linear regression between N-tester and SPAD chlorophyll indices. Measurements were performed at three phenological stages, on chasselas and pinot noir grapes (n = 500; Pully, Switzerland).

- The measurement of the chlorophyll index is a rapid, non-destructive and relatively inexpensive method that provides a good approximation of the nitrogen nutrition status of the vine during the season.
- An excellent overall linear regression was established between the SPAD 502 and N-tester indices, despite the effects of phenological stage and cultivar, allowing an easy conversion between the two indices.
- Nitrogen status thresholds were established for the SPAD index at the phenological stage veraison, by converting the existing interpretation of the N-tester index.

Table 1. Thresholds for the interpretation of the chlorophyll index (N-tester and SPAD) of the foliage measured at veraison (main leaves of the cluster area), on three grape varieties.

Assessment nitrogen status	N-tester			SPAD 502*		
	chasselas	pinot noir	gamay	chasselas	pinot noir	gamay
very low	< 420	< 460	< 380	< 31	< 34	< 29
low	420-460	460-500	380-430	31-34	34-36	29-32
normal	460-540	500-580	430-530	34-38	36-41	32-38
high	540-570	580-620	530-580	38-40	41-43	38-41
very high	> 570	> 620	> 580	> 40	> 43	> 41

\* Thresholds for the SPAD were calculated from the thresholds for the N-tester established in the Swiss vineyard by Spring and Jelmini (2002).