

EFFECT OF DISTILLERY WASTE APPLICATION ON VINE BEHAVIOUR AND SOIL CHARACTERISTICS

J. DELAS ⁽¹⁾, Mme P. DUREAU ⁽¹⁾, M. GODEFERT ⁽²⁾, C. JUSTE ⁽¹⁾,
M. MENET ⁽¹⁾, C. MOLOT ⁽¹⁾, J.-P. SOYER ⁽¹⁾, B. VESSOT ⁽²⁾

(Science du Sol n° 1985-3)

The effect of distillery wastes from Cognac area on vine behaviour and the characteristics of a calcareous soil were studied in a field experiment for 5 year-duration : Table I summarizes the initial soil characteristics.

The schedule of the experiment (4 randomized replicates) was as follows :

- T₀ : control plots ;
- T₁ : mineral fertilized plots ;
- V₆₋₀ : distillery waste amended plots (6 mm/year according to the maximum authorized admissible level) ;
- V₆₋₁ : distillery waste amended plots (6 mm/year) and mineral fertilized plots ;
- V₃₀₋₀ : distillery waste amended plots (30 mm/year) ;
- V₃₀₋₁ : distillery waste amended plots (30 mm/year) and mineral fertilized plots.

Analysis of distillery waste and the amounts of N, P₂O₅ and K₂O applied to the sprayed plots are summarized in tables II and III.

Table II :

Mean composition of the distillery wastes supplied and standard deviation.

pH	3,38	(0,17)
Matière sèche %	1,44	(0,56)
Cendres %	0,29	(0,09)
N mg/l	289	(69)
P "	65	(19)
K "	964	(135)
Ca "	136	(27)
Mg "	48	(8)
Na "	11	(2)
Cu "	1,17	(0,22)

Table III :

Annual N, P₂O₅ and K₂O amounts brought by the distillery wastes (in kg/ha/year).

	N	P ₂ O ₅	K ₂ O
Traitement V ₆	17	9	69
Traitement V ₃₀	87	45	347

Treatments rarely affect significantly pruning weight and vine yield (Table IV and V). The mineral fertilization (T₁, V₆₋₁, V₃₀₋₁) slightly increased pruning weight ; no yield reduction was observed in plots receiving the largest waste applications (V₃₀₋₀ et V₃₀₋₁). The initial heterogeneity of the field experiment area increased later by frosts makes it difficult to interpret the effect of the small rate of waste applications (V₆₋₀ and V₆₋₁).

(1) INRA, Station d'Agronomie, Centre de Recherches de Bordeaux, 33140 Pont-de-la-Maye.

(2) E. Rémy Martin et Cie, Boîte Postale 27, 16102 Cognac, Cédex.

Table IV : Pruning weight : mean of 4 replicates (in g per plant).

	1977 Avant mise en place de l'essai	1978	1979	1980	1982	Moyenne 1978-1982
T ₀	615,8 ab	982,9 b	643,0 a	675,0 ab	1010,4 a	827,8 ab
T ₁	672,0 bc	962,0 b	672,3 a	736,3 bcd	1075,9 ab	861,6 b
V ₆₋₀	664,1 bc	847,9 a	630,0 a	687,5 ab	990,4 a	788,9 a
V ₆₋₁	586,2 ab	792,5 a	653,7 a	776,3 cd	1060,0 ab	820,6 ab
V ₃₀₋₀	547,1 a	827,9 a	652,2 a	650,0 a	1148,9 b	819,7 ab
V ₃₀₋₁	589,2 ab	843,7 a	707,5 a	710,0 abc	1147,1 b	852,1 b

Mean values not followed by the same letter are significantly different at the 0.05 level of probability (BONFERRONI test).

Sugar content and acidity of musts appeared to be correlated with plant vigour and vine yield (Table VI); at very high rates of waste application, K content of must was increased.

Mineral fertilization increased N content and decreased P content in petioles harvested at veraison time (Table VII); at the largest waste application, K content of petioles increased and Mg content decreased. Nitrogen originating from mineral fertilizers was more efficient than nitrogen originating from distillery wastes as the first one alone increased N content of petioles.

Nitrogen mineralization in soil [NO₃- production] was correlated with mineral fertilizer application (Figure 1); distillery wastes did not affect net mineralization even at the high rate of application.

Soil analysis at the end of the experiment (Table VIII) indicate that the level of exchangeable potassium is the only modified characteristic of soil receiving high rates of distillery waste (V₃₀₋₀ and V₃₀₋₁).

In summary, it appeared that distillery waste spraying on soils of Cognac area at the maximum authorized admissible level had no injurious effect on plants and likely on the environment.