

Table 1 Five Walnut genotypes origin and characteristics

Cultivars	Code	Origin	Blooming	Dichogamy	Bearing
Franquette	V1	France	Late	Protodorous	Terminal
Hartley	V2	California	Quite early	Protodorous	Terminal
Landrace	V3	Tunisia	Early	homogamous	Lateral
Parisienne	V4	France	Late	Protodorous	Terminal
Lozeronne	V5	France	Quite early	protodorous	Terminal

Table 2 Environmental description of the experimental site.

Region	Code	Av. Temp February to May	Rainfall (mm)	Year	Soil texture	Latitude	Longitude	Altitude
Bousalem	E1	T max=20.58°C Tmin=8.42°C	280mm	2019	silty- clayey to clayey	36° 36' 34" North	8° 58' 17" East	127 m above sea level
	E2	T max=23.1°C T min=8.57°C	190mm	2020				
Mateur	E3	T Max=14.88°C T Min=4.14°C	730mm	2019	Clay- silty- sandy	37° 02' 24" North	9° 39' 54" Est	51 m above sea level
	E4	T Max=16.9°C T Min=6.55°C	470mm	2020				

*ENV. Environment, Av. Temp. Average temperature

** meteorological data from INM Tunisia, Dr Abderrazzek Arif

Table 3 Combined analysis (random ANOVA2): F-test values for all traits and sum squares values of the 5 genotypes tested at two environments over a period of 2 years 2019–2020.

Fruit traits	Valeurs et signification du test F		
	Genotype	Environment	InteractionGxE
Nut weight	154.35***	11.6847***	16.47***
Kernel weight	76.04***	6.50***	9.17 ***
Kernel ratio%	6,03***	1,16 ^{NS}	4,40***

Note.ANOVA: analysis of variance.

***Significant according toStudent'st-testatthe.01probabilitylevel.

Tableau 4.Mean kernel ratio (%) and ranks of each genotype in each of the four environments

Variété	E1 Bousalem 19		E2 Bousalem 20		E3 Mater 19		E4 Mater 20		Total	
	kernel ratio (%)	Rang	kernel ratio (%)	Rang	kernel ratio (%)	Rang	kernel ratio (%)	Rang	kernel ratio (%) $\bar{Y}_{i..}$	Rang
Franquette	34.34	5	34.39	4	49.39	1	34.34	4	38.11	3
Hartley	39.06	2	38.70	2	34.94	4	36.18	3	37.22	4
Landrace	34.39	4	28.42	5	34.85	5	31.46	5	32.28	5
Parisienne	36.21	3	49.70	1	37.83	2	37.34	2	40.27	1
Lozeronne	41.51	1	38.04	3	35.99	3	39.68	1	38.81	2
$\bar{Y}_{.j.}$	37.1	-	37.85	-	38.6	-	35.8	-	$\bar{Y}_{...}$ 37.34	-
x_j	-0.24		0.51		1.26		-1.54			

Tableau 5 Average kernel ratio (%) and values of the parameters of adaptability and stability of 5 genotypes

Genotype/Environment	Kernel ratio (%)	bi	Wi" (Wi%)	Sli%	ASV% Axes 1-2
Franquette	38.11	4.449	42.00	33.33	31.00
Hartley	37.22	-0.224	5.59	19.44	11.42
Landrace	32.28	0.47	8.31	8.33	12.03
Parisienne	40.27	1.689	33.97	16.67	22.01
Lauzerone	38.81	-1.387	10.13	22.22	23.54
Mean	37.34	1	20	20	20
Environment1 B19	37.10		14.09		21.54
Environment2 B20	37.85	-	36.87	-	35.24
Environment3 M19	38.60		44.87		22.97
Environment4 M20	35.80		4.17		20.25
Mean	37.34	-	20	-	20

- *Note.* W_i : Wricke(1962) ecovalence; b_i : Finlay and Wilkinson(1963) regression coefficient; S_{ii} : stability index; ASV: AMMI stability value. B19: Bousalem 2019; B20: Bousalem 2020; M19: Mateur 2019; M20: Mateur 2020.