Supplements

Supplement 1: Morphological characters

N°	characters	code
1	Plant height (cm)	(PH)
2	N° of Branches/plant	(nB)
3	Stem Diameter (cm)	(SD)
4	Leaf length (cm)	(LL)
5	Leaf width (cm)	(LW)
6	N°of leaves	(nL)
7	N° of flower	(nF)
8	N°of nodes	(nN)
9	Fresh weight (g)	(FW)
10	Dry weight (g)	(DW)
11	seed yield/plant (g)	(SY)

Supplement 2: Raw data of morphological studies:

Morphological results: 4 populations

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The ANOVA Procedure

Information on class levels

Class	Levels	Values
Origin	4	Al FR Nfz Tbk
Num	26	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Number of observations 88

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The ANOVA Procedure

Dependent Variable: HP

Source	DDL	Sum of square	Value Medium square	F	Pr > F
Model	28	7374.10072	263.36074	2.45	0.0019
Error	59	6336.57826	107.39963		
Corrected Total	87	13710.67898			

R square	Coeff Var	Racine MSE	LP Mean
0.537836	27.52308	10.36338	37.65341

Source	DDL	Anova SS	Value Medium square	F	Pr > F
Origin	3	1534.109243	511.369748	4.76	0.0049
Num	25	5839.991477	233.599659	2.18	0.0075

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The ANOVA Procedure

Dependent Variable: nB

Source	DDL	Sum of square	Value Medium square	F	Pr > F
Model	28	1439.639327	51.415690	4.03	<.0001
Error	59	751.951582	12.744942		
Corrected Total	87	2191.590909			

R carré	Coeff Var	Racine MSE	NbR Mean
0.656892	72.38722	3.570006	4.931818

Source	DDL	Value Anova SS	Medium square	F	Pr > F
Origin	3	885.2150849	295.0716950	23.15	<.0001
Num	25	554.4242424	22.1769697	1.74	0.0418

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The ANOVA Procedure

Dependent Variable: SD

Source	DDL	Sum of square	Value Medium square	F	Pr > F
Model	28	12.58050283	0.44930367	2.72	0.0006
Error	59	9.73767899	0.16504541		
Corrected Total	87	22.31818182			

R carré	Coeff Var	Racine MSE	DBP Mean
0.563689	14.53280	0.406258	2.795455

Source	DDL	Value Anova SS	Medium square	F	Pr > F
Origin	3	3.17898768	1.05966256	6.42	0.0008

Num	25	9.40151515	0.37606061	2.28	0.0050

The ANOVA Procedure

Dependent Variable: nN

Source	DDL	Sum of square	Medium square	Value F	Pr > F
Model	28	170.4547453	6.0876695	1.49	0.0978
Error	59	240.4088911	4.0747270		
Corrected Total	87	410.8636364			

R carré	Coeff Var	Racine MSE	NbN Mean
0.414869	16.98245	2.018595	11.88636

Source	DDL	Anova SS	Medium square	Value F	Pr > F
Origin	3	4.7577756	1.5859252	0.39	0.7612
Num	25	165.6969697	6.6278788	1.63	0.0643

The ANOVA Procedure

Dependent Variable: LL

Source	DDL	Sum of square	Medium square	Value F	Pr > F
Model	28	55.8130989	1.9933250	1.96	0.0149
Error	59	59.8719011	1.0147780		
Corrected Total	87	115.6850000			

R carré	Coeff Var	Racine MSE	LongF Mean
0.482458	17.44350	1.007362	5.775000

Valeur

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	24.27476557	8.09158852	7.97	0.0002
Num	25	31.53833333	1.26153333	1.24	0.2434

The ANOVA Procedure

Dependent Variable: LW

Source	DDL	Somme des carrés	Value Medium square	F	Pr > F
Model	28	35.87880753	1.28138598	1.85	0.0243
Error	59	40.95107884	0.69408608		
Corrected Total	87	76.82988636			

R carré	Coeff Var	Racine MSE	larF Mean
0.466990	17.62789	0.833118	4.726136

Value

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	9.73892116	3.24630705	4.68	0.0054
Num	25	26.13988636	1.04559545	1.51	0.0999

The ANOVA Procedure

Dependent Variable: nL

Source	DDL	Sum of square	Value Medium square	F	Pr > F
Model	28	117291.9030	4188.9965	2.52	0.0014
Error	59	97943.8698	1660.0656		

Corrected Total	87	215235.7727			

R carré	Coeff Var	Racine MSE	NbF Mean
0.544946	64.83659	40.74390	62.84091

Value

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	18981.04690	6327.01563	3.81	0.0145
Num	25	98310.85606	3932.43424	2.37	0.0035

The ANOVA Procedure

Dependent Variable: nF

Sum of Value

Source	DDL	square	Medium square	F	Pr > F
Model	28	70509.5122	2518.1969	2.30	0.0037
Error	59	64690.3060	1096.4459		
Corrected Total	87	135199.8182			

R carré	Coeff Var	Racine MSE	Nbfr Mean
0.521521	63.73383	33.11262	51.95455

Value

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	37967.86067	12655.95356	11.54	<.0001
Num	25	32541.65152	1301.66606	1.19	0.2890

The ANOVA Procedure

Dependent Variable: FW

Sum of Value

Source	DDL	square	Medium square	F	Pr > F

Model	28	1954.187063	69.792395	2.20	0.0056
Error	59	1874.787482	31.776059		
Corrected Total	87	3828.974545			

R carré	Coeff Var	Racine MSE	PF Mean
0.510368	75.38879	5.637026	7.477273

Value

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	212.694185	70.898062	2.23	0.0940
Num	25	1741.492879	69.659715	2.19	0.0070

The ANOVA Procedure

Dependent Variable: DW

Sum of Value

Source	DDL	square	Medium square	F	Pr > F
Model	28	172.0740000	6.1455000	2.08	0.0092
Error	59	174.3984988	2.9559068		
Corrected Total	87	346.4724989			

R carré	Coeff Var	Racine MSE	PS Mean
0.496645	75.41056	1.719275	2.279886

Value

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	22.7044262	7.5681421	2.56	0.0635
Num	25	149.3695739	5.9747830	2.02	0.0139

The ANOVA Procedure

Dependent Variable: SY

Sum of Value

Source	DDL	square	Medium square	F	Pr > F

Model	28	5.56994603	0.19892664	0.76	0.7878
Error	59	15.50302284	0.26276310		
Corrected Total	87	21.07296886			

R carré	Coeff Var	Racine MSE	Rdtgr Mean
0.264317	140.0123	0.512604	0.366114

Value

Source	DDL	Anova SS	Medium square	F	Pr > F
Origin	3	1.54781341	0.51593780	1.96	0.1293
Num	25	4.02213261	0.16088530	0.61	0.9110

The ANOVA Procedure

Duncan's Multiple Range Test for HP

Note: This test controls the Type I comparison wise error rate, not the experiment wise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	107.3996
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	6.285	6.611	6.827

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	43.346	26	FR
A			
B A	38.524	21	Nfz
B			
B	33.762	21	G
B			
B	33.425	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for nB

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	12.74494
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	2.165	2.277	2.352

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	10.571	21	G
B	3.538	26	FR
B			
B	3.143	21	Nfz
B			
B	2.700	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for SD

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	0.165045
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	.2464	.2592	.2676

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	3.0476	21	Nfz
A			
B A	2.8571	21	G
B			
B	2.7692	26	FR
C	2.5000	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for nN

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	4.074727
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	1.224	1.288	1.330

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	12.1905	21	G
A			
A	12.0476	21	Nfz
A			
A	11.7308	26	FR
A			
A	11.6000	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for LL

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	1.014778
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	.6109	.6426	.6636

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	6.5462	26	FR
B	5.6619	21	G
B			
B	5.4905	21	Nfz
B			
B	5.1900	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for LW

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	0.694086
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	.5052	.5315	.5488

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	5.1846	26	FR
A			
B A	4.7762	21	Nfz
B			
B	4.4619	21	G
B			
B	4.3550	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for nL

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	1660.066
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes.

Mean numbers	2	3	4
Critical range	24.71	25.99	26.84

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	79.57	21	G
A			
A	70.86	21	Nfz
A			
B A	61.46	26	FR
B			
B	38.65	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for nF

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	1096.446
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes

Mean numbers	2	3	4
Critical range	20.08	21.12	21.81

Means with the same letter are not very different.

Duncan Groupement	Moyenne	Nb	origin
A	71.76	21	G
A			
A	70.31	26	FR
B	36.40	20	Tbk
B			
B	24.24	21	Nfz

The ANOVA Procedure

Duncan's Multiple Range Test for FW

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	31.77606
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes.

Mean numbers	2	3	4
Critical range	3.419	3.596	3.713

Means with the same letter are not very different.

Duncan Groupement	Mean	Nb	origin
A	8.981	21	G
A			
B A	8.381	26	FR
B A			
B A	7.410	21	Nfz
B			
B	4.795	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for DW

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	2.955907
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes.

Mean number	2	3	4
Critical range	1.043	1.097	1.133

Means with the same letter are not very different.

Duncan Groupement	Mean	Nb	origin
A	2.9390	21	G
A			
B A	2.4342	26	FR
B A			
B A	2.1914	21	Nfz
B			
B	1.4800	20	Tbk

The ANOVA Procedure

Duncan's Multiple Range Test for SY

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	59
Middle Square Error	0.262763
Harmonic mean of cell sizes	21.77468

Note: Uneven cell sizes.

Nomber of means	2	3	4
Critical range	.3109	.3270	.3377

Means with the same letter are not very different.

Duncan Groupement	Mean	Nb	origin
A	0.5537	21	G
A			
B A	0.3744	26	FR
B A			
B A	0.3642	20	Tbk
B			
B	0.1701	21	Nfz

CORRELATION

11 Variables : PH nB SD nN LL LW nL nF FW DW SY

Simple statistics

Variable	Nb	Mean	Standard deviation	Sum	Minimum	Maximum
PH	88	37.65341	12.55365	3314	11.00000	66.00000
nB	88	4.93182	5.01903	434.00000	1.00000	27.00000
SD	88	2.79545	0.50649	246.00000	2.00000	4.00000
nN	88	11.88636	2.17315	1046	6.00000	17.00000
LL	88	5.77500	1.15313	508.20000	3.50000	8.50000
LW	88	4.72614	0.93974	415.90000	3.10000	7.80000
nL	88	62.84091	49.73906	5530	12.00000	289.00000
nF	88	51.95455	39.42107	4572	5.00000	144.00000
FW	88	7.47727	6.63409	658.00000	1.00000	37.40000
DW	88	2.27989	1.99561	200.63000	0.30000	11.70000
SY	88	0.36611	0.49216	32.21800	0	2.95000

Coefficients of correlation of Pearson, N = 88

Prob > |r| under H0: Rho=0

	PH	nB	SD	nN	LL	LW
PH	1.00000	0.20814	0.48676	0.62590	0.29310	0.15555
		0.0517	<.0001	<.0001	0.0056	0.1479
nB	0.20814	1.00000	0.16627	0.32281	0.03267	-0.08564
	0.0517		0.1216	0.0022	0.7625	0.4276

SD	0.48676	0.16627	1.00000	0.45901	0.28241	0.27217
	<.0001	0.1216		<.0001	0.0077	0.0103
nN	0.62590	0.32281	0.45901	1.00000	0.34516	0.23674
	<.0001	0.0022	<.0001		0.0010	0.0264
LL	0.29310	0.03267	0.28241	0.34516	1.00000	0.86657
	0.0056	0.7625	0.0077	0.0010		<.0001
LW	0.15555	-0.08564	0.27217	0.23674	0.86657	1.00000
	0.1479	0.4276	0.0103	0.0264	<.0001	

Coefficients of correlation of Pearson, N = 88

Prob > |r| under H0: Rho=0

	nL	nF	FW	DW	SY
PH	0.52113	0.47038	0.51412	0.50845	0.27303
	<.0001	<.0001	<.0001	<.0001	0.0101
nB	0.69401	0.44591	0.63983	0.68258	0.58647
	<.0001	<.0001	<.0001	<.0001	<.0001
SD	0.35093	0.18317	0.33316	0.34671	0.10195
	0.0008	0.0876	0.0015	0.0009	0.3446
nN	0.51047	0.43774	0.52873	0.54445	0.28609
	<.0001	<.0001	<.0001	<.0001	0.0069
LL	0.19338	0.31918	0.34016	0.32936	0.13762
	0.0710	0.0024	0.0012	0.0017	0.2010

LW	0.11700	0.21080	0.31760	0.29913	0.09550
	0.2777	0.0487	0.0026	0.0046	0.3761

CORRELATION

Coefficients of correlation of Pearson, N = 88

Prob > |r| under H0: Rho=0

	PH	nB	SD	nN	LL	LW
nL	0.52113	0.69401	0.35093	0.51047	0.19338	0.11700
	<.0001	<.0001	0.0008	<.0001	0.0710	0.2777
nF	0.47038	0.44591	0.18317	0.43774	0.31918	0.21080
	<.0001	<.0001	0.0876	<.0001	0.0024	0.0487
FW	0.51412	0.63983	0.33316	0.52873	0.34016	0.31760
	<.0001	<.0001	0.0015	<.0001	0.0012	0.0026
DW	0.50845	0.68258	0.34671	0.54445	0.32936	0.29913
	<.0001	<.0001	0.0009	<.0001	0.0017	0.0046
SY	0.27303	0.58647	0.10195	0.28609	0.13762	0.09550
	0.0101	<.0001	0.3446	0.0069	0.2010	0.3761

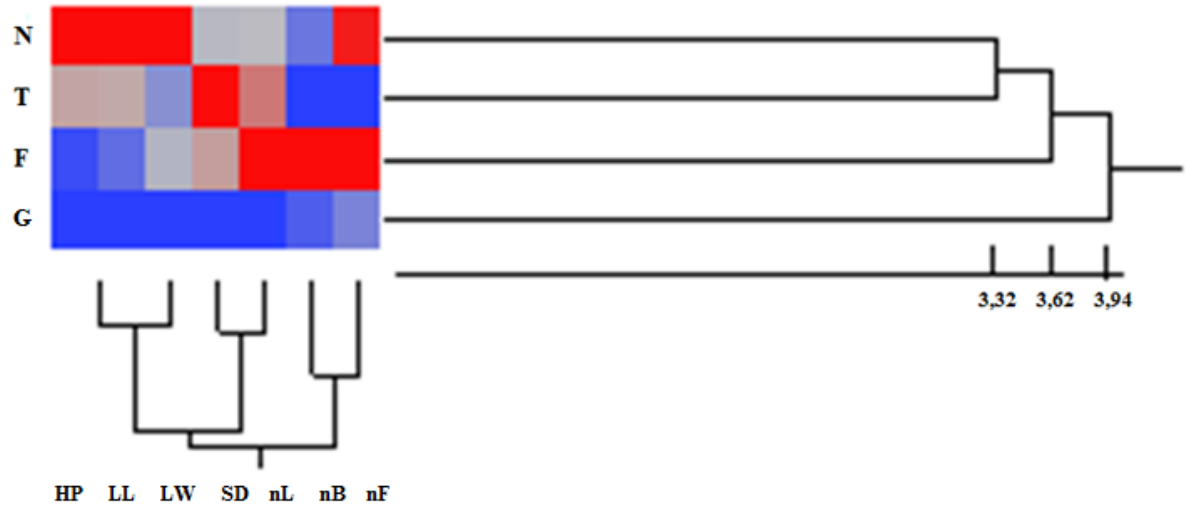
Coefficients of correlation of Pearson, N = 88

Prob > |r| under H0: Rho=0

	nL	nF	FW	DW	SY

nL	1.00000	0.45474	0.87297	0.86252	0.54454
		<.0001	<.0001	<.0001	<.0001
nF	0.45474	1.00000	0.47847	0.50428	0.62369
	<.0001		<.0001	<.0001	<.0001
FW	0.87297	0.47847	1.00000	0.98901	0.57544
	<.0001	<.0001		<.0001	<.0001
DW	0.86252	0.50428	0.98901	1.00000	0.61140
	<.0001	<.0001	<.0001		<.0001
SY	0.54454	0.62369	0.57544	0.61140	1.00000
	<.0001	<.0001	<.0001	<.0001	

Supplement 3: Dendrogram established from Euclidean squared for standard variables using average method based agro-morphological traits among four populations of *M. officinalis*



HP = height plant; SD = stem diameter; nf = number of leaves; LL = leaf length; LW= leaf width; nF = number of flowers; nB = number of branches