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Using salinity to improve nutritional and market value of strawberries

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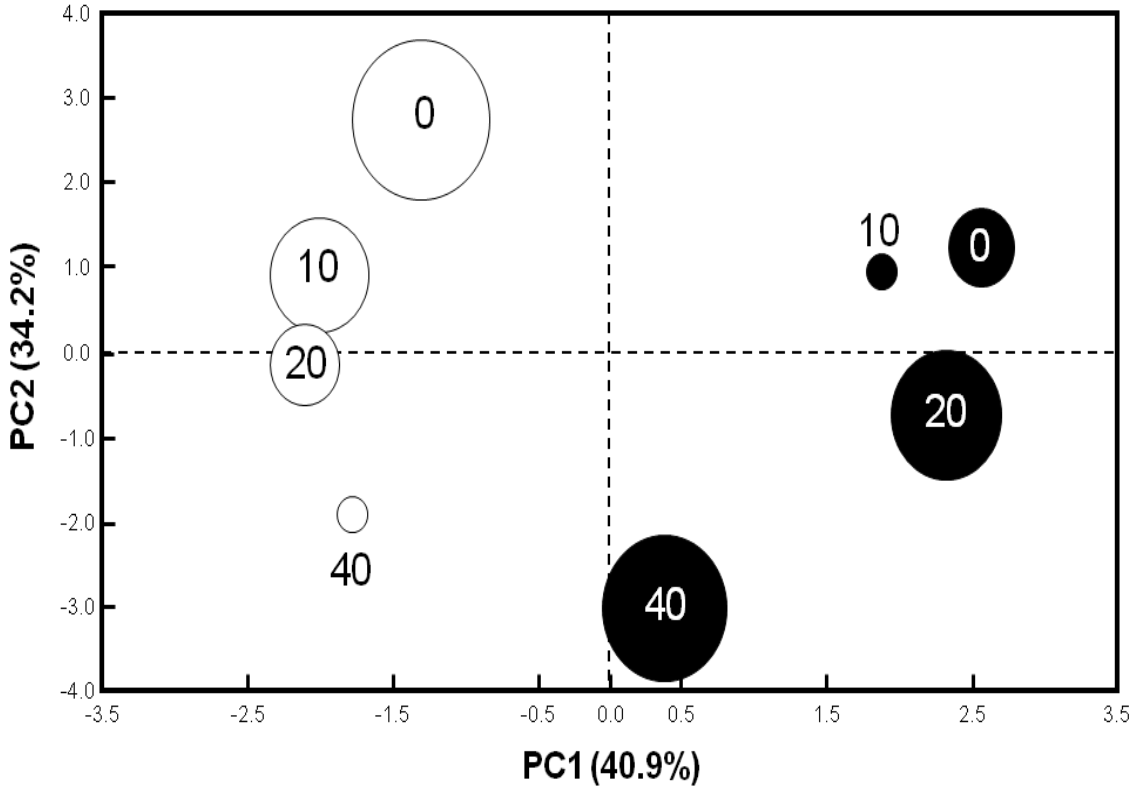

Supplementary Figure 1. Principal component analysis based on fourteen variables (see the legend of Table 7). The scatter plot reports the projection of 8 cases (two strawberry genotypes for 4 salinity levels) on the first two components (PC1, PC2), accounting for 75.1% of total variability: the diameter of each balloon is proportional to the variability observed for each case. White balloons = cv Elsanta; Black balloons = cv Elsinore. Numbers inside or near each balloon indicate the salinity (NaCl) treatment (0 = 0 mM; 10 = 10 mM; 20 = 20 mM; 40 = 40 mM).

Layout of the experiment

Elsanta 8 plants 0 mM	Elsinore 8 plants 0 mM	Elsanta 8 plants 0 mM
Elsinore 8 plants 0 mM	Elsanta 8 plants 0 mM	Elsinore 8 plants 0 mM

Elsanta 8 plants 20 mM	Elsinore 8 plants 20 mM	Elsanta 8 plants 20 mM
Elsinore 8 plants 20 mM	Elsanta 8 plants 20 mM	Elsinore 8 plants 20 mM

Elsanta 8 plants 10 mM	Elsinore 8 plants 10 mM	Elsanta 8 plants 10 mM
Elsinore 8 plants 10 mM	Elsanta 8 plants 10 mM	Elsinore 8 plants 10 mM

Elsanta 8 plants 40 mM	Elsinore 8 plants 40 mM	Elsanta 8 plants 40 mM
Elsinore 8 plants 40 mM	Elsanta 8 plants 40 mM	Elsinore 8 plants 40 mM

Supplementary Figure 2. Layout of the experiment. Each table represents a greenhouse bench, dedicated to one salt treatment, and divided into 6 plots, (3 for each cultivar). There are 8 plants in each replicate plot.

Methods for Principal Component Analysis

In the present study, the co-relation method was preferred over covariance since PCA on the covariance matrix is not invariant to a component-wise change of scale (Bilodeau and Duchesne 2002). With this method the original space for variable measurements was projected down onto two low-dimensional subspaces. One of these was case-related (two strawberry genotypes for 4 salinity levels for a total of 8 cases); the other was variable-related. The fourteen variables were fruit yield per plant, mean fruit weight, fruit number per plant, TSS, TA, fruit appearance (sensory attribute), fruit aroma (sensory attribute), fruit taste (sensory attribute), total sensory evaluation (sum of fruit appearance, aroma and taste), total phenolic content, total flavonoid content, total anthocyanin content, FRAP antioxidant activity, DPPH antioxidant activity. The variable-related subspace was analysed (factor loading) to understand the co-relation between the variables and factors (principal components).

Results for Principal Component Analysis

Principal component analysis (PCA) was employed as a multivariate statistical tool for evidencing the multiple inter-correlations between the different assays and the strawberry genotypes grown under different salinity levels. The Kaiser criterion was used to identify the number of principal components (PC's) explaining the greater part of the total variance. Accordingly, a PC with an eigenvalue < 1.0 has no legitimacy for the description of the total variance (Kaiser 1960). Out of the fourteen extracted PCs, only the first and the second PC satisfied the Kaiser criterion, cumulatively explaining 75.1% of the total variance (Table 6). The first PC accounted for 40.9% of the total variance: it showed high loadings (>0.70) for fruit yield and number per plant, and high negative loadings (<-0.70) for titratable acidity, total content of phenolics and flavonoids. The second PC explained 34.2% of the total variance and showed high positive loadings (>0.70) for the fruit appearance and aroma, and total sensory evaluation (sum of sensory fruit appearance, aroma and taste). In contrast, high negative loadings (<-0.70) were observed for antioxidant activities (DPPH, FRAP).

Supplementary Table 1. Factor loadings of the fourteen variables used in the principal component analysis on the first two principal components (PC1, PC2).

Variable	PC1	PC2
PY	0.856	0.282
FW	-0.574	0.668
FN	0.896	0.182
TSS	0.153	0.547
TA	-0.783	0.212
APP	-0.075	0.719
ARO	0.049	0.754
TST	0.018	0.509
TSE	0.004	0.893
TPC	-0.707	-0.589
TFC	-0.863	-0.244
TAC	-0.559	-0.657
DPPH	-0.181	-0.804
FRAP	-0.097	-0.706
Eigenvalue	4.065	3.386
% of variance	40.9	34.2

PY = fruit plant yield; FW = fruit weight; FN = fruit number; TSS = total soluble solids; TA = titratable acidity; APP= fruit appearance (sensory attribute); ARO= fruit aroma (sensory attribute); TST = fruit taste (sensory attribute); TSE = total sensory evaluation (sum of fruit appearance, aroma and taste); TPC = total phenolic content; TFC= total flavonoid content; TAC = total anthocyanin content; FRAP = FRAP antioxidant activity; DPPH = DPPH antioxidant activity.