

# Osmotic stress affects physiological responses and growth characteristics of three pistachio cultivars

A. Esmailpour, M. Labeke, +1 author P. Damme • Published in *Acta Physiologiae Plantarum* 5 June 2015 •

Agricultural and Food Sciences, Environmental Science

**TLDR** Drought stress levels decreased chlorophyll pigments, fresh weight, stem elongation, leaf nitrogen content, leaf water potential and increased water use efficiency (WUE), but Ohadi maintained better its photosynthetic capacity compared to Akbari and Kaleghochi.

**Abstract** Pistachio (*Pistacia vera* L.) has a high tolerance to drought and soil salinity. Although adult pistachio trees are well known to be drought tolerant, the studies on physiological adaptation of pistachio cultivars to drought are limited. Therefore, three pistachio cultivars, i.e., Akbari, Kaleghochi, and Ohadi were subjected to three osmotic drought stress treatments: control (−0.1 MPa), moderate (−0.75 MPa) and severe drought (−1.5 MPa) stress using PEG 6000 for a 14-day period. All drought stress treatments decreased net photosynthesis (Pn), stomatal conductance (gs), intercellular CO<sub>2</sub> concentration (Ci), and transpiration rate (E), but Ohadi maintained better its photosynthetic capacity compared to Akbari and Kaleghochi. Maximum quantum yield of PSII photochemistry (Fv/Fm), effective PSII quantum yield (ΦPSII) and photochemical quenching (qP) were also reduced. The chlorophyll fluorescence parameters indicated that Akbari was more susceptible to the applied drought stress. Drought stress levels decreased chlorophyll pigments, fresh weight, stem elongation, leaf nitrogen content (N), leaf water potential and increased water use efficiency (WUE). Proline increased strongly under drought stress for Akbari. After 2 weeks of stress a recovery of 2 weeks was applied. This period was insufficient to fully restore the negative effects of the applied stress on the studied cultivars. Based on the reduction of photosynthesis and the increase of the proline content Akbari seems more sensitive to the applied drought stress.

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## Micrografting of Pistacia vera L.: A review

A. A. Mohammed

H.A. Arkwazee

Agricultural and Food Sciences, Environmental Science · [SVU-International Journal of Agricultural...](#)

2024

*Pistacia vera* is widely propagated by budding or via grafting onto a convenient rootstock to obtain determined sex type trees at the early stage of growth or deal with the environmental issues that... [Expand](#)

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## Effects of Rootstock on Water Stress, Physiological Parameters, and Growth of the Pistachio Tree

Eduardo Fernández-Suela

Pablo Garcia-Estringana

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Noelia Ramírez-Martín

Jesus Alegre

Agricultural and Food Sciences, Environmental Science · [Horticulturae](#) · 2023

In Spain, almost all pistachios are grown under water-stress conditions. Pistachio plants have sophisticated mechanisms to avoid or tolerate stress. It is known that the rootstock affects responses... [Expand](#)

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## Proteomics approach to investigating osmotic stress effects on pistachio

Rambod Pakzad

F. Fatehi

M. Kalantar

M. Maleki

Environmental Science, Biology · [Frontiers in Plant Science](#) · 2022

**TLDR** A number of proteins using 2DE-MS, involved in mitigating osmotic stress in pistachio were identified and two of the representative genes illustrated a positive correlation among transcript level and protein expression and had a similar trend in regulation of gene and protein. [Expand](#)

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## Regulatory Mechanisms of bHLH Transcription Factors in Plant Adaptive Responses to Various Abiotic Stresses

Yuchen Qian

Tongyao Zhang

+4 authors

E. Pi

Biology, Environmental Science · [Frontiers in Plant Science](#) · 2021

**TLDR** As increasing research demonstrates that flavonoids are usually induced under fluctuating environments, the latest research progress and future research prospects are described on the mechanisms of how flavonoid biosynthesis is regulated by bHLHs in the regulation of the plant's responses to abiotic stresses. [Expand](#)

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## Comparative Transcriptome Analysis Provides Insights into the Seed Germination in Cotton in Response to Chilling Stress

Qian Shen

Si-ping Zhang

+11 authors

C. Pang

Agricultural and Food Sciences, Environmental Science ·

[International Journal of Molecular Sciences](#) · 2020

**TLDR** Results from hormone content measurements and the related gene expression analysis indicated that IAA, CTK, and GA3 may promote germination of the cold-tolerant variety, while ABA inhibits it, and the understanding of cottonseed germination and physiological regulations under chilling conditions by multiple pathways is expanded. [Expand](#)

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## Hydrogen peroxide-induced salt tolerance in relation to antioxidant systems in pistachio seedlings

M. Bagheri

M. Gholami

B. Baninasab

Environmental Science, Biology · [Scientia Horticulturae](#) · 2019

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## Chlorophyll fluorescence imaging reveals genetic variation and loci for a photosynthetic trait in diploid potato.

Aina E. Prinzenberg

M. Viquez-Zamora

J. Harbinson

P. Lindhout

S. van Heusden

Biology, Environmental Science ·

[Physiologia Plantarum : An International Journal...](#) · 2018

## Comparative Study on the Effect of Water Stress and Rootstock on Photosynthetic Function in Pistachio (*Pistacia vera* L.) Trees

A. Ranjbar Environmental Science · 2017

The aim of this study is to evaluate the effects of water deficit stress on chlorophyll fluorescence (CF) characteristics of photosystem II (PSII) and pigment contents in two rootstock seedlings... [Expand](#)

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## Variation in biochemical characteristics, water status, stomata features, leaf carbon isotope composition and its relationship to water use efficiency in pistachio (*Pistacia vera* L.) cultivars under drought stress condition

A. Esmailpour M. Labeke R. Samson P. Boeckx P. Damme Environmental Science, Biology · 2016

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## Alternative Oxidase Pathway Optimizes Photosynthesis During Osmotic and Temperature Stress by Regulating Cellular ROS, Malate Valve and Antioxidative Systems

Challabathula Dinakar Abhaypratap Vishwakarma A. S. Raghavendra K. Padmasree Environmental Science, Biology ·

[Frontiers in Plant Science](#) · 2016

**TLDR** The present study reveals the importance of alternative oxidase (AOX) pathway in optimizing photosynthesis under osmotic and temperature stress conditions in the mesophyll protoplasts of *Pisum sativum*, and the observed changes in NaHCO<sub>3</sub>-dependent O<sub>2</sub> evolution, cellular ROS, redox ratios of Malate/OAA, NAD(P)H/NAD(P). [Expand](#)

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### Chlorophyll fluorescence--a practical guide.

K. Maxwell G. Johnson Biology, Environmental Science · [Journal of Experimental Botany](#) · 2000

**TLDR** An introduction for the novice into the methodology and applications of chlorophyll fluorescence is provided and a selection of examples are used to illustrate the types of information that fluorescence can provide. [Expand](#)

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### THE RESPONSE OF PISTACHIO TREES TO WATER STRESS AS AFFECTED BY TWO DIFFERENT ROOTSTOCKS

C. Germanà Agricultural and Food Sciences, Environmental Science · 1997

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### Pistachio production in Iran

A. Sheibani Agricultural and Food Sciences, Environmental Science · 1995

## Effect of mycorrhizal inoculation on ecophysiological responses of pistachio plants grown under different water regimes

V. Bagheri M. H. Shamshiri H. Shirani H. Roosta Environmental Science · [Photosynthetica \(Praha\)](#) · 2011

**TLDR** Data obtained in present study emphasized that Qazvini is more tolerant to water stress than Badami because photosynthesis activity in QZvini was more efficiently protected than in the Badami, as indicated by related parameters. [Expand](#)


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## Reactive oxygen species homeostasis and signalling during drought and salinity stresses.

Gad Miller N. Suzuki Sultan Ciftci-Yilmaz R. Mittler Environmental Science, Biology · [Plant, Cell and Environment](#) · 2010

**TLDR** An overview of ROS homeostasis and signalling in response to drought and salt stresses is provided and the current understanding of ROS involvement in stress sensing, stress signalling and regulation of acclimation responses is discussed.

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## Limitation to photosynthesis in water-stressed leaves: stomata vs. metabolism and the role of ATP.

D. Lawlor Biology, Environmental Science · [Annals of Botany](#) · 2002

Decreasing relative water content (RWC) of leaves progressively decreases stomatal conductance (gs), slowing CO<sub>2</sub> assimilation (A) which eventually stops, after which CO<sub>2</sub> is evolved. In some studies,... [Expand](#)

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## A role for cytosolic glutamine synthetase in the remobilization of leaf nitrogen during water stress in tomato

Diana Bauer K. Biehler +4 authors T. Becker Biology, Environmental Science · 1997

**TLDR** A role of GS-I in the generation of glutamine for the transport of the nitrogen that is remobilized in tomato leaves in response to chronic water stress is suggested. [Expand](#)

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## Effects of site characteristics on nitrogen retranslocation from senescing leaves

J. M. Del Arco A. Escudero M. Garrido Environmental Science · 1991

**TLDR** The efficiency of nitrogen recovery before leaf fall in different woody species was studied with respect to the phenology of leaf abscission and to different estimates of nitrogen availability, finding that gradual leaf fall seems to be an adaptation to water stress in regions with an arid or semiarid climate. [Expand](#)

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## Morphological, physiological and biochemical responses of plants to drought stress

S. Anjum Xiao-yu Xie Longchang Wang M. Saleem Chen Man W. Lei Environmental Science, Biology · 2011

**TLDR** This review focuses on the ability and strategies of higher plants to respond and adapt to drought stress, and the critical roles of osmolyte accumulation under drought stress conditions. [Expand](#)

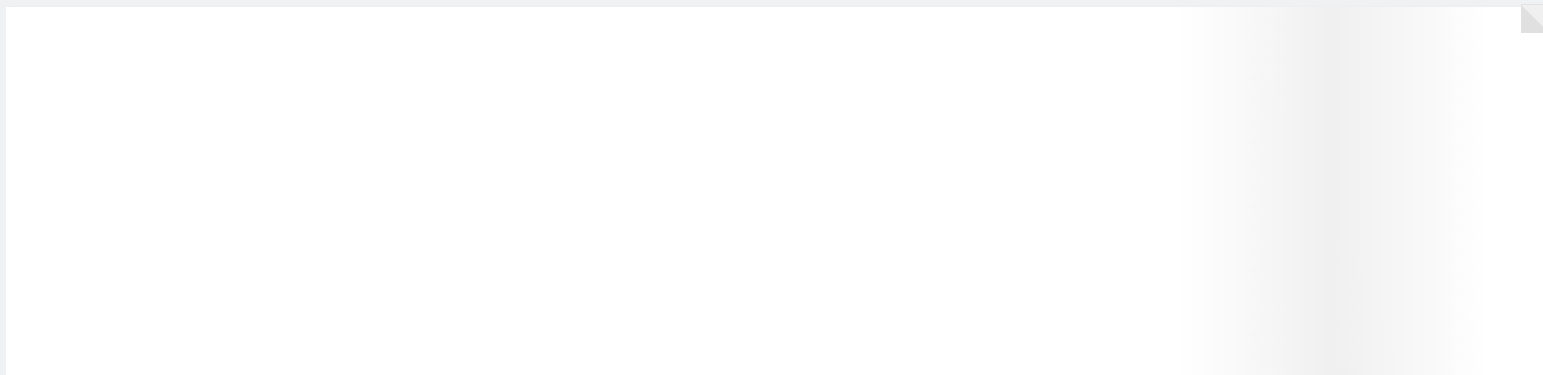
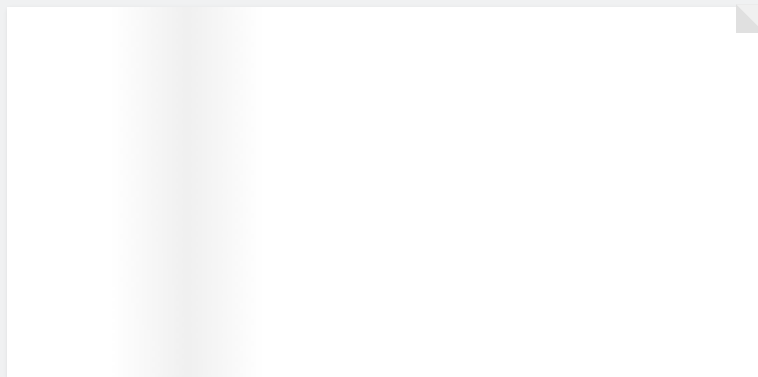
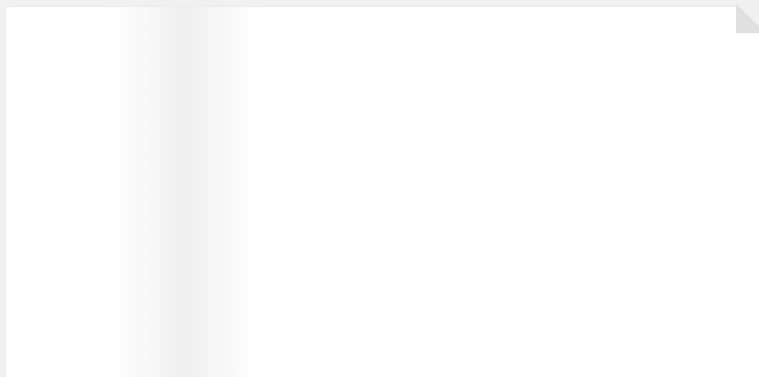
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## Evaluation of salt and drought resistance of two pistachio species (*Pistacia khinjuk* and *P. mutica*) in terms of ecophysiological and growth characteristics

Abolfazl Ranjbar Fardooei Environmental Science, Agricultural and Food Sciences · 2001

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