

ΓΕΝΙΚΑ ΘΕΜΑΤΑ

Γεωργία ακριβείας και λίπανση

Οφέλη και προοπτικές

Βιβλιογραφία

- 1. Αδημοσίευτα δεδομένα του Εργαστηρίου Αναλύσεως Εδαφών και Υδάτων του Ινστιτούτου Βιομηχανικών και Κτηνοτροφικών του ΕΛΓΟ ΔΗΜΗΤΡΑ
- 2. Kousar, R. et al. 2025. Farm-scale soil spatial variability at a mountain research centre in Northwestern Himalayas. *Scientific Reports*. 15:19705. <https://doi.org/10.1038/s41598-025-03695-0>
- 3. Pierce and Nowak. 1999. Aspects of Precision Agriculture. *Adv. Agron.* 67:1-85.
- 4. <https://www.ispag.org/resources/definition>
- 5. Dtattatreva, S. et al. 2023. Conventional to Modern Methods of Soil NPK Sensing: A Review. *Sensors* PP(99):1-1 DOI:10.1109/JSEN.2023.3334243
- 6. Bahmutsky, S. et al. 2024. A review of life cycle impacts and costs of precision agriculture for cultivation of field crops. *Sust. Prod. Cons.* 52:347-362.
- 7. Papadopoulos, G. et al. 2024. Economic and environmental benefits of digital agricultural technologies in crop production: A review. *Smart Agricultural Technology* 8: 100441
- 8. Vatsanidou, A. et al. 2020. Life Cycle Assessment of Variable Rate Fertilizer Application in a Pear Orchard. *Sustainability*, 12, 6893; doi:10.3390/su12176893.
- 9. Karydas, C. et al. 2023. Embedding a precision agriculture service into a farm management information system-ifarma/PreFer, *Smart Agric. Technol.* 4 (2023) 100175.
- 10. Stamatiadis, S. et al. 2017. Variable-rate nitrogen fertilization of winter wheat under high spatial resolution. *Prec. Agric.* DOI 10.1007/s11119-017-9540-7
- 11. Stamatiadis, S. et al. 2019. Variable-rate application of high spatial resolution can improve cotton N-use efficiency and profitability. *Prec. Agric.* <https://doi.org/10.1007/s11119-019-09690-6>
- 12. Evangelou, E. et al. 2020. Evaluation of sensor-based field-scale spatial application

- of granular N to maize. *Prec. Agric.* <https://doi.org/10.1007/s11119-019-09705-2>

ΚΗΠΕΥΤΙΚΑ

Η θερμική καταπόνηση στο φασόλι

Προσεγγίσεις με στόχο τον μετριασμό των επιπτώσεών της

Βιβλιογραφία

- [1]. Kotak S., J. Larkindale, U. Lee, P. von Koskull-Döring, E. Vierling and K.D. Scharf, 2007. Complexity of the heat stress response in plants. *Current Opinion in Plant Biology* 10(3): 310-316.
- [2]. Wahid A., S. Gelani, M. Ashraf and M.R. Foolad, 2007. Heat tolerance in plants: An overview. *Environmental and Experimental Botany* 61(3): 199–223.
- [3]. Dickson M.H. and R. Petzoldt, 1989. Heat tolerance and pod set in green beans. *Journal of the American Society for Horticultural Science* 114(5): 833–836.
- [4]. Omae H., A. Kumar and M. Shono, 2012. Adaptation to high temperature and water deficit in the common bean (*Phaseolus vulgaris* L.) during the reproductive period. *Journal of Botany* 2012(2): 803413.
- [5]. Bitá C.E. and T. Gerats, 2013. Plant tolerance to high temperature in a changing environment: scientific fundamentals and production of heat stress-tolerant crops. *Frontiers in Plant Science* 4: 273.
- [6]. Moore C.E., K. Meacham-Hensold, P. Lemonnier, R.A. Slattery, C. Benjamin, C.J. Bernacchi, T. Lawson, A.P. Cavanagh, 2021. The effect of increasing temperature on crop photosynthesis: From enzymes to ecosystems. *Journal of Experimental Botany* 72(8): 2822–2844.
- [7]. Smith F.L. and R.H. Pryor, 1962. Effects of maximum temperature and age on flowering and seed production in three bean varieties. *Hilgardia* 33: 669–688.
- [8]. Marsh L.E. and D.W. Davis, 1985. Influence of high temperature on the performance of some *Phaseolus* species at different developmental stages. *Euphytica* 34: 431–439.
- [9]. Monterroso V.A. and W.C. Wien, 1990. Flower and pod abscission due to heat stress in beans. *Journal of the American Society for Horticultural Science* 115(4): 631–634.
- [10]. Ofir M., Y. Gross, F. Bangerth and J. Kige, 1993. High temperature effects on pod and seed production as related to hormone levels and abscission of reproductive structures in common bean (*Phaseolus vulgaris* L.). *Scientia Horticulturae* 55: 201–211.
- [11]. Rainey K.M. and P.D. Griffiths, 2005. Diallel analysis of yield components of snap beans exposed to two temperature stress environments. *Euphytica* 142: 43–53.
- [12]. Hoffmann L., N.D. Ribeiro, S.S. da Rosa, E. Jost, N.L. Poersch and S.L.P. Medeiros, 2007. Response of beans cultivars to high air temperature in the reproductive period. *Ciencia Rural* 37(6): 1543–1548.
- [13]. da Silva D.A., C.A.F. Pinto-Maglio and I.C. Oliveira, 2020. Influence of high temperature on the reproductive biology of dry edible bean (*Phaseolus vulgaris* L.). *Scientia Agricola* 77(3): e20180233.
- [14]. Consultative Group on International Agricultural Research (CGIAR), 2015. Developing beans that can beat the heat. 12 p. <https://cgspace.cgiar.org/server/api/core/bitstreams/7ee0e113-39af-4741-8722-1f2006181c74/content19>. Carillo P., 2025. Can biostimulants enhance plant resilience to heat and water stress in the Mediterranean hotspot? *Plant Stress* 16: 100802.
- [15]. Dickson M.H. and M.A. Boettger, 1984. Effect of high and low temperatures on pollen germination and seed set in green beans. *Journal of the American Society for Horticultural Science* 109(3): 372–374.
- [16]. Ihsan M.Z., I. Daur, F. Alghabari, S. Alzamanan, S. Rizwan, M. Ahmad, M. Waqas and W. Shafqat, 2019. Heat stress and plant development: Pole of sulphur metabolites and management strategies. *Acta Agriculturae Scandinavica, Section B - Soil & Plant Science*, 69(4): 332–342.
- [17]. Waraich E., R. Ahmad, A. Haleem and T. Aziz, 2012. Alleviation of temperature stress by nutrient management in crop plants: A review. *Journal of Soil Science and Plant Nutrition* 12(2): 221–244.
- [18]. Hasanuzzaman M., K. Nahar, M. Alam, R. Roychowdhury and M. Fujita, 2013. Physiological, biochemical, and molecular mechanisms of heat stress tolerance

- in plants. *International Journal of Molecular Sciences* 14(5): 9643–9684.
- [19]. Sun W., M.H. Shahrajabian, Y. Kuang and N. Wang, 2024. Amino acids biostimulants and protein hydrolysates in agricultural sciences. *Plants* 13: 210.
 - [20]. Feng D., X. Jia, Z. Yan, J. Li, J. Gao, W. Xiao, X. Shen and X. Sun, 2023. Underlying mechanisms of exogenous substances involved in alleviating plant heat stress. *Plant Stress* 10:100288.
 - [21]. Araújo W.L., T. Toghe, K. Ishizaki, C.J. Leaver and A.R. Fernie, 2011. Protein degradation – An alternative respiratory substrate for stressed plants. *Trends in Plant Science* 16(9): 489–498.
 - [22]. Botta A., 2013. Enhancing plant tolerance to temperature stress with amino acids: An approach to their mode of action. *Acta Horticulturae* 1009: 29–35.
 - [23]. Krinis D.I., D.S. Kasampalis and A.S. Siomos, 2023. Biostimulants as a means to alleviate the transplanting shock in lettuce. *Horticulturae* 9(9): 968.
 - [24]. Tsouvaltzis P., A. Koukounaras and A. Siomos, 2014. Application of amino acids improves lettuce crop uniformity and inhibits nitrate accumulation induced by the supplemental inorganic nitrogen fertilization. *International Journal of Agriculture and Biology* 16: 951–955.
 - [25]. Koukounaras A., P. Tsouvaltzis and A.S. Siomos, 2013. Effect of root and foliar application of amino acids on the growth and yield of greenhouse tomato in different fertilization levels. *Journal of Food, Agriculture and Environment* 11(2): 644–648.
 - [26]. Frew A., L.A. Weston, O.L. Reynolds and G.M. Gurr, 2018. The role of silicon in plant biology: A paradigm shift in research approach. *Annals of Botany* 121: 1265–1273.
 - [27]. Saha G., M.G. Mostofa, Md.M. Rahman, L-S.P. Tran, 2021. Silicon-mediated heat tolerance in higher plants: A mechanistic outlook. *Plant Physiology and Biochemistry* 166: 341–347.
 - [28]. Zenda T., S. Liu, A. Dong and H. Duan, 2021. Revisiting sulphur-The once neglected nutrient: It's roles in plant growth, metabolism, stress tolerance and crop production. *Agriculture* 11(7): 626.
 - [29]. Sharma R.K., M.S. Cox, C. Oglesby and J.S. Dhillon, 2024. Revisiting the role of sulfur in crop production: A narrative review. *Journal of Agriculture and Food Research* 15: 101013.
 - [30]. Ingenbleek Y., 2006. The nutritional relationship linking sulfur to nitrogen in living organisms. *Journal of Nutrition* 136(6): 1641S–1651S.
 - [31]. Tabatabai M.A., 1984. Importance of sulphur in crop production. *Biogeochemistry* 1(1): 45–62.
 - [32]. Baudoin J.P. and A. Maquet, 1999. Improvement of protein and amino acid contents in seeds of food legumes. A case study in Phaseolus. *Biotechnologie, Agronomie, Sociéti et Environnement* 3(4): 220–224.
 - [33]. Pandurangan S., M. Sandercock, R. Beyaert, K.L. Conn, A. Hou and F. Marsolais, 2015. Differential response to sulfur nutrition of two common bean genotypes differing in storage protein composition. *Frontiers in Plant Sciences* 6: 92.
 - [34]. Hell R., M.S. Khan and M. Wirtz, 2010. Cellular biology of sulfur and its functions in plants. In: Hell R. and R.R. Mendel (Eds.), *Cell Biology of Metals and Nutrients*, Plant Cell Monographs 17. Springer-Verlag, Berlin/Heidelberg, Germany, pp. 243–279.
 - [35]. Mazid M., T.A. Khan and F. Mohammad, 2011. Role of secondary metabolites in defense mechanisms of plants. *Biology and Medicine* 3(2): 232–249.
 - [36]. Mazid M., Z.H. Khan, S. Quddusi, T.A. Khan and F. Mohammad, 2011a. Significance of sulphur nutrition against metal induced oxidative stress in plants. *Journal of Stress Physiology & Biochemistry* 7: 165–184.
 - [37]. Anjum N.A., S.S. Gill, S. Umar, I. Ahmad, A.C. Duarte and E. Pereira, 2012. Improving growth and productivity of oleiferous brassicas under changing environment: Significance of nitrogen and sulphur nutrition, and underlying mechanisms. *Scientific World Journal* 657808.
 - [38]. Anjum N.A., R. Gill, M. Kaushik, M. Hasanuzzaman, E. Pereira, I. Ahmad, N. Tuteja and S.S. Gill, 2015. ATP-sulfurylase, sulfurcompounds, and plant stress tolerance. *Frontiers in Plant Science* 6: 210.
 - [39]. Prioretti L., B. Gontero, R. Hell and M. Giordano, 2014. Diversity and regulation of ATP sulfurylase in photosynthetic organisms. *Frontiers in Plant Science* 5: 597.
 - [40]. Latowski D., E. Surowka and K. Strzałka, 2010. Regulatory role of components of ascorbate–glutathione pathway in plant stress tolerance. In: Anjum N., MT. Chan and S. Umar (Eds.) *Ascorbate-Glutathione Pathway and Stress Tolerance in Plants*. Springer, Dordrecht, pp. 1–53.
 - [41]. Gill S.S. N. Tuteja, 2010. Reactive oxygen species and antioxidant machinery in abiotic stress tolerance in crop plants. *Plant Physiology and Biochemistry* 48: 909–930.
 - [42]. Głowacka A., T. Gruszecki, B. Szostak and S. Michałek, 2019. The response of common bean to sulphur and molybdenum fertilization. *International Journal of Agronomy* 3830712.
 - [43]. Farooq M.A. and KJ. Dietz, 2015. Silicon as versatile player in plant and human biology: Overlooked and poorly understood. *Frontiers in Plant Science* 12(6): 994.
 - [44]. Luyckx M., J.F. Hausman, S. Lutts and G. Guerriero 2017. Silicon and plants: Current knowledge and technological perspectives. *Frontiers in Plant Science* 8: 411.
 - [45]. Pavlovic J., L. Kostic, P. Bosnic, E.A. Kirkby and M. Nikolic, 2021. Interactions of silicon with essential and beneficial elements in plants. *Frontiers in Plant Science* 12: 697592.
 - [46]. Ma J.F., F.J. Zhao, Z. Rengel and I. Cakmak, 2023. Beneficial elements. In: Rengel Z., I. Cakmak, P.J. White (Eds.), *Marschner's Mineral Nutrition of Plants (Fourth Edition)*. Academic Press, San Diego, pp. 387–418.
 - [47]. Raza T., M. Abbas, Amna, S. Imran, M.Y. Khan, A. Rebi and Z. Rafe-Rad and N.S. Eash, 2023. Impact of silicon on plant nutrition and significance of silicon mobilizing bacteria in agronomic practices. *Silicon* 15: 3797–3817.
 - [48]. Ma J.F. and N. Yamaji, 2006. Silicon uptake and accumulation in higher plants. *Trends in Plant Science* 11(8): 392–397.
 - [49]. Irfan M., M.A. Maqsood, H.U. Rehman, W. Mahboob, N. Sarwar, O.B.A. Hafeez, S. Hussain, S. Ercisli, M. Akhtar and T. Aziz, 2023. Silicon nutrition in plants under water-deficit conditions: Overview and prospects. *Water* 15(4): 739.
 - [50]. Laane H.M., 2018. The effects of foliar sprays with different silicon compounds. *Plants* 7(2): 45.



- [51]. Tubana B.S., 2023. Dynamics of silicon in soil and plant to establish silicate fertilization. In: de Mello Prado R. (Ed.), *Benefits of Silicon in the Nutrition of Plants*. Springer, Cham, pp. 57–73.
- [52]. Guivel M.H., J.G. Menzies and R.R. Bilanger, 2007. Effect of root and foliar applications of soluble silicon on powdery mildew control and growth of wheat plants. *European Journal of Plant Pathology* 119: 429–436.
- [53]. Rodrigues F.A., L.J. Dallagnol, H.S.S. Duarte and L.E. Datnoff, 2015. Silicon control of foliar diseases in monocots and dicots. In: Rodrigues F.A. and L.E. Datnoff (Eds.), *Silicon and Plant Diseases*. Springer, Switzerland, pp. 67–108.
- [54]. Rezende D.C., F.A. Rodrigues, V. Carr-Missio, D.A. Schurt, K. Kawamura and G.H. Korndorfer, 2009. Effect of root and foliar applications of silicon on brown spot development in rice. *Australasian Plant Pathology* 38: 67–73.
- [55]. Rodrigues F.A., H.S.S. Duarte, D.C. Rezende, J.A. Wordell Filho, G.H. Korndorfer and L. Zambolim, 2010. Foliar spray of potassium silicate on the control of angular leaf spot on beans. *Journal of Plant Nutrition* 33: 2082–2093.
- [56]. Crusciol C.A.C., R.P. Soratto, G.S.A. Castro, C.H.M. Costa and J.F. Neto, 2013. Foliar application of stabilized silicic acid on soybean, common bean and peanut. *Revista Cienca Agronomicas* 44(2): 404–410.
- [57]. de Souza Junior J.P., R. de Mello Prado, M.B. Soares, J.L.F. da Silva, V.H. de Farias Guedes, M.M. dos Santos Sarah and J.O. Cazetta, 2021. Effect of different foliar silicon sources on cotton plants. *Journal of Soil Science and Plant Nutrition* 21: 95–103.
- [58]. Barros T.C., R. De Mello Prado, C. Garcia Roque, G. Ribeiro Barzotto and C. Roberto Wassolowski, 2018. Silicon and salicylic acid promote different responses in legume plants. *Journal of Plant Nutrition* 41(16): 2116–2125.
- [59]. Tebow J.B., L.L. Houston and R.W. Dickson, 2021. Silicon foliar spray and substrate drench effects on plant growth, morphology, and resistance to wilting with container-grown edible species. *Horticulturae* 7(9): 263.
- [60]. dos Santos Sarah M.M., R. de Mello Prado, J.P. de Souza Junior, G.C.M. Teixeira, J.C. dos Santos Duarte and R.L.S. de Medeiros, 2021. Silicon supplied via foliar application and root to attenuate potassium deficiency in common bean plants. *Scientific Reports* 11:19690.
- [61]. Adata M.H. and R.T. Besford, 1986. The effects of silicon on cucumber plants grown in recirculating nutrient solution. *Annals of Botany* 58(3): 343–351.
- [62]. Deren C.W., L.E. Datnoff, G.H. Snyder and F.G. Martin, 1994. Silicon concentration, disease response, and yield components of rice genotypes grown on flooded organic histosols. *Crop Science* 34: 733–737.
- [63]. Kim S.G., K.W. Kim, E.W. Park and D. Choi, 2002. Silicon-induced cell wall fortification of rice leaves: A possible cellular mechanism of enhanced host resistance to blast. *Phytopathology* 92: 1095–1103.
- [64]. Buck G.B., G.H. Korndorfer, A. Nolla and L. Coelho, 2008. Potassium silicate as foliar spray and rice blast control. *Journal of Plant Nutrition* 31: 231–237.
- [65]. Jeer M., Y. Yele, K.C. Sharma and N.B. Prakash, 2021. Exogenous application of different silicon sources and potassium reduces pink stem borer damage and improves photosynthesis, yield and related parameters in wheat. *Silicon* 13: 901–910.
- [66]. Liang Y.C., W.C. Sun, J. Si and V. Rømhøld, 2005. Effects of foliar- and root-applied silicon on the enhancement of induced resistance to powdery mildew in *Cucumis sativus*. *Plant Pathology* 54: 678–685.
- [67]. Dallagnol L.J., F.A. Rodrigues, O. Tanaka, L. Amorim and L.E.A. Camargo, 2012. Effect of potassium silicate on epidemic components of powdery mildew on melon. *Plant Pathology* 61: 323–330.
- [68]. Cacique I.S., G.P. Domiciano, W.R. Moreira, F.A. Rodrigues, M.F.A. Cruz, N.S. Serra and A.B. Catalü, 2013. Effect of root and leaf applications of soluble silicon on blast development in rice. *Bragantia* 72(3): 304–309.
- [69]. Ma J.F., K. Nishimura and E. Takahashi, 1989. Effect of silicon on the growth of rice plant at different growth stages. *Soil Science and Plant Nutrition* 35(3): 347–356.
- [70]. Jafarei Y., E.F.M. Tabrizi and A. Bybordi, 2015. Effect of different stages and times of silicon foliar spray on yield and yield components of bean. *Cumhuriyet Science Journal* 36: 81–92.

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Έλεγχος κύπερης και πλατύφυλλων ζιζανίων

Βιβλιογραφία

1. Buchanan, G.A and E.R. Burns. (1969). Influence of various periods of weed competition on cotton. *Weed Sci. Soc. of Amer. Abst. No.* 151
2. Buchanan, G.A. 1979. Cotton weed loss Committee Report, 1978. *Proc. Beltwide Cotton Res. Conf.* P. 134-136.
3. Ελευθεροχωρινός Η. Γ. (2020). Ζιζανιολογία: Βιολογία και Διαχείριση Ζιζανίων, Ζιζανιοκτόνα, Φυτά και Περιβάλλον (5η έκδοση), Αθήνα, Εκδόσεις ΑγροΤύπος, σελ. 42-44, 304, 308.
4. Πέτρος Χ. Λόλας (2003). ZIZANIA – ZIZANIOKTONA, Τύχη και Συμπεριφορά στο Περιβάλλον (1η έκδοση), Θεσσαλονίκη, Εκδόσεις Σύγχρονη Παιδεία, σελ 23-27.

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Μία συνεργασία για την αναβίωση της γεωργίας στο Οροπέδιο της Φολόης

Βιβλιογραφία

1. Huyghe, C. (1997). White lupin (*Lupinus albus* L.). *Field Crops Research*, 53(1-3), 147–160.
2. Cousin, R. (1997). Peas (*Pisum sativum* L.). *Field Crops Research*, 53(1-3), 111–130.
3. Fekadu, E., Kibret, K., Melese, A., & Bedadi, B. (2018). Yield of faba bean (*Vicia faba* L.) as affected by lime, mineral P, farmyard manure, compost and rhizobium in acid soil of Lay Gayint District, northwestern highlands of Ethiopia. *Agriculture & Food Security*, 7(1), 16.
4. Gazoulis, I., Kanatas, P., Antonopoulos, N., Tataridas, A., & Travlos, I. (2022). False seedbed for agroecological weed management in forage cereal-legume intercropped and monocultures in Greece. *Agronomy*, 13(1), 123.
5. Gazoulis, I., Petraki, D., Antonopoulos, N., Kalorizou, H., Kanatas, P., & Travlos, I. (2025). Stale seedbed and intercropping for agroecological weed management in vetch (*Vicia sativa* L.) in the context of the ONE GREEN Project. *Agronomy*, 15(11), 2617.

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Έλεγχος ευρέως φάσματος ζιζανίων

Βιβλιογραφία

- 1. Ελευθεροχωρινός Η. Γ. (2020). Ζιζανιολογία: Βιολογία και Διαχείριση Ζιζανίων, Ζιζανιοκτόνα, Φυτά και Περιβάλλον (5η έκδοση), Αθήνα, Εκδόσεις ΑγροΤύπος, σελ. 261-262, 284-286, 289-290.
- 2. Ευθυμία Παπαδοπούλου-Μουρκίδου (2008). Γεωργικά Φάρμακα, Χημεία, Φαρμακολογία - Φαρμακοκινητική / Μεταβολισμός / Τρόπος δράσης, Τοξικολογία, Οικοτοξικολογία και Συμπεριφορά και Τύχη στο Περιβάλλον, Θεσσαλονίκη, Εκδόσεις Μέθεξις, σελ. 488, 498.
- 3. Πέτρος Χ. Λόλας (2003). ZIZANIA – ZIZANIOKTONA, Τύχη και Συμπεριφορά στο Περιβάλλον (1η έκδοση), Θεσσαλονίκη, Εκδόσεις Σύγχρονη Παιδεία, σελ 23-27. ■