

ΦΥΤΑ ΜΕΓΑΛΗΣ ΚΑΛΛΙΕΡΓΕΙΑΣ

Η πολυεπίπεδη επίδραση του καιρού στα χειμερινά σιτηρά

Τι συμβαίνει στην τρέχουσα περίοδο και οι κλιματικές προοπτικές στην Ελλάδα

Βιβλιογραφία

- Ahmed, N., Zhang, Y., Li, K., Zhou, Y., Zhang, M., Li, Z., 2019. Exogenous application of glycine betaine improved water use efficiency in winter wheat (*Triticum aestivum* L.) via modulating photosynthetic efficiency and antioxidative capacity under conventional and limited irrigation conditions. *The Crop Journal* 7, 635–650. <https://doi.org/10.1016/j.cj.2019.03.004>
- Ali, A.H., Said, E.M., Abdelgawad, Z.A., 2022. The role of seaweed extract on improvement drought tolerance of wheat revealed by osmoprotectants and DNA (cpDNA) markers. *Braz. J. Bot* 45, 857–867. <https://doi.org/10.1007/s40415-022-00820-5>
- Bancal, P., 2009. Decorrelating source and sink determinism of nitrogen remobilization during grain filling in wheat. *Annals of Botany* 103, 1315–1324. <https://doi.org/10.1093/aob/mcp077>
- Barry, R.G., Chorley, R.J., 2010. *Atmosphere, weather, and climate*, 9th ed. ed. Routledge, London ; New York.
- Battilani, P., Rossi, V., Giorni, P., Pietri, A., Gualla, A., van der Fels Klerx, H.J., Booij, C.J.H., Moretti, A., Logrieco, A., Miglietta, F., Toscano, P., Miraglia, M., De Santis, B., Brera, C., 2012. Modelling, predicting and mapping the emergence of aflatoxins in cereals in the EU due to climate change. *EFS3* 9. <https://doi.org/10.2903/sp.efsa.2012.EN-223>
- Cleland, E., Chuine, I., Menzel, A., Mooney, H., Schwartz, M., 2007. Shifting plant phenology in response to global change. *Trends in Ecology & Evolution* 22, 357–365. <https://doi.org/10.1016/j.tree.2007.04.003>
- Εθνικό Αστεροσκοπείο Αθηνών, 2022. Κλιματικές αποκλίσεις ανά έτος/μήνα – Δεκέμβριος 2022. Διαθέσιμο στη δ/νση: https://meteo.gr/climatic_deviation.cfm
- Feidas, H., 2017. Trend analysis of air temperature time series in Greece and their relationship with circulation using surface and satellite data: recent trends and an update to 2013. *Theor Appl Climatol* 129, 1383–1406. <https://doi.org/10.1007/s00704-016-1854-2>
- Feidas, H., Makrogiannis, T., Bora-Senta, E., 2004. Trend analysis of air temperature time series in Greece and their relationship with circulation using surface and satellite data: 1955?2001. *Theor Appl Climatol* 79, 185–208. <https://doi.org/10.1007/s00704-004-0064-5>
- Feidas, H., Nouloupoulou, Ch., Makrogiannis, T., Bora-Senta, E., 2007. Trend analysis of precipitation time series in Greece and their relationship with circulation using surface and satellite data: 1955–2001. *Theor. Appl. Climatol.* 87, 155–177. <https://doi.org/10.1007/s00704-006-0200-5>
- Gaudet, D.A., Laroche, A., Yoshida, M., 1999. Low temperature-wheat-fungal interactions: A carbohydrate connection. *Physiologia Plantarum* 106, 437–444. <https://doi.org/10.1034/j.1399-3054.1999.106412.x>
- Ge, Q., Wang, H., Rutishauser, T., Dai, J., 2015. Phenological response to climate change in China: a meta analysis. *Glob Change Biol* 21, 265–274. <https://doi.org/10.1111/gcb.12648>
- Ghafoor, I., Habib-ur-Rahman, M., Ali, M., Afzal, M., Ahmed, W., Gaiser, T., Ghaffar, A., 2021. Slow-release nitrogen fertilizers enhance growth, yield, NUE in wheat crop and reduce nitrogen losses under an arid environment. *Environ Sci Pollut Res* 28, 43528–43543. <https://doi.org/10.1007/s11356-021-13700-4>
- Gregory, F.G., Purvis, O.N., 1948. Reversal of Vernalization by High Temperature. *Nature* 161, 859–860. <https://doi.org/10.1038/161859a0>
- Gusta, L.V., Fowler, D.B., 1976. Effects of temperature on dehardening and rehardening of winter cereals. *Can. J. Plant Sci.* 56, 673–678. <https://doi.org/10.4141/cjps76-107>
- Hanslin, H.M., Mortensen, L.M., 2010. Autumn growth and cold hardening of winter wheat under simulated climate change. *Acta Agriculturae Scandinavica, Section B - Soil & Plant Science* 60, 437–449. <https://doi.org/10.1080/09064710903133906>
- Henze, M., Beyer, M., Klink, H., Verreet, J.-A., 2007. Characterizing Meteorological Scenarios Favorable for Septoria tritici Infections in Wheat and Estimation of Latent Periods. *Plant Disease* 91, 1445–1449. <https://doi.org/10.1094/PDIS-91-11-1445>
- Hess, D.E., Shaner, G., 1987. Effect of moisture and temperature on development of Septoria tritici blotch in wheat. *Phytopathology* 77(2), 215–219. <https://doi.org/10.1094/Phyto-77-215>
- Holman, J.D., Schlegel, A.J., Thompson, C.R., Lingensfelder, J.E., 2011. Influence of Precipitation, Temperature, and 56 Years on Winter Wheat Yields in Western Kansas. *Crop Management* 10, 1–10. <https://doi.org/10.1094/CM-2011-1229-01-RS>
- Hu, C., Tian, Z., Gu, S., Guo, H., Fan, Y., Abid, M., Chen, K., Jiang, D., Cao, W., Dai, T., 2018. Winter and spring night-warming improve root extension and soil nitrogen supply to increase nitrogen uptake and utilization of winter wheat (*Triticum aestivum* L.). *European Journal of Agronomy* 96, 96–107. <https://doi.org/10.1016/j.eja.2018.03.008>
- Igrejas, G. and Branlard, G., 2020. The Importance of Wheat, in: Igrejas, G., Ikeda, T.M., Guzman, C. (Eds.). *Wheat Quality For Improving Processing And Human Health*. Springer International Publishing, Cham. <https://doi.org/10.1007/978-3-030-34163-3>
- Kamoutsis, A., Matsoukis, A., Chronopoulou-Sereli, A., 2010. *Triticum Aestivum* L. Phenological response to air temperature in Greece. *Italian Journal of Agrometeorology* 2, 51–55. http://www.agrometeorologia.it/documenti/Rivista2010_2/AIAM%202-2010_pag51.pdf
- Khodaei, D., Javanmardi, F., Khaneghah, A.M., 2021. The global

- overview of the occurrence of mycotoxins in cereals: a three-year survey. *Current Opinion in Food Science* 39, 36–42. <https://doi.org/10.1016/j.cofs.2020.12.012>
- Kristensen, K., Schelde, K., Olesen, J.E., 2011. Winter wheat yield response to climate variability in Denmark. *J. Agric. Sci.* 149, 33–47. <https://doi.org/10.1017/S0021859610000675>
 - Lithourgidis, A.S., Damalas, C.A., Gagianas, A.A., 2006. Long-term yield patterns for continuous winter wheat cropping in northern Greece. *European Journal of Agronomy* 25, 208–214. <https://doi.org/10.1016/j.eja.2006.05.003>
 - Liu, X., Ju, X., Zhang, F., Pan, J., Christie, P., 2003. Nitrogen dynamics and budgets in a winter wheat–maize cropping system in the North China Plain. *Field Crops Research* 83, 111–124. [https://doi.org/10.1016/S0378-4290\(03\)00068-6](https://doi.org/10.1016/S0378-4290(03)00068-6)
 - Madgwick, J.W., West, J.S., White, R.P., Semenov, M.A., Townsend, J.A., Turner, J.A., Fitt, B.D.L., 2011. Impacts of climate change on wheat anthesis and fusarium ear blight in the UK. *Eur J Plant Pathol* 130, 117–131. <https://doi.org/10.1007/s10658-010-9739-1>
 - Magan, N., Medina, A., Aldred, D., 2011. Possible climate-change effects on mycotoxin contamination of food crops pre- and postharvest: Mycotoxins and climate change. *Plant Pathology* 60, 150–163. <https://doi.org/10.1111/j.1365-3059.2010.02412.x>
 - Marougianni, G., Melas, D., Kioutsioukis, I., Feidas, H., Zanis, P., Anadranistakis, E. Trend Analysis for climatic time series for Greece. 2013, in: Helmis, C.G., Nastos, P.T. (Eds.). *Advances in meteorology, climatology and atmospheric physics*, Springer Atmospheric Sciences. Springer Berlin Heidelberg, Berlin, Heidelberg. <https://doi.org/10.1007/978-3-642-29172-2>
 - Mavromatis, T., 2012. Changes in exceptional hydrological and meteorological weekly event frequencies in Greece. *Climatic Change* 110, 249–267. <https://doi.org/10.1007/s10584-011-0095-8>
 - Mavromatis, T., 2015. Crop–climate relationships of cereals in Greece and the impacts of recent climate trends. *Theor Appl Climatol* 120, 417–432. <https://doi.org/10.1007/s00704-014-1179-y>
 - Menzel, A., Sparks, T.H., Estrella, N., Koch, E., Aasa, A., Ahas, R., Alm-Köbler, K., Bissolli, P., Braslavská, O., Briede, A., Chmielewski, F.M., Crepinsek, Z., Curnel, Y., Dahl, E., Defila, C., Donnelly, A., Filella, Y., Jatczak, K., Mege, F., Mestre, A., Nordli, Ψ., Pepuelas, J., Pirinen, P., Remi ova, V., Scheifinger, H., Striz, M., Susnik, A., Van Vliet, A.J.H., Wielgolaski, F.-E., Zach, S., Zust, A., 2006. European phenological response to climate change matches the warming pattern: EUROPEAN PHENOLOGICAL RESPONSE TO CLIMATE CHANGE. *Global Change Biology* 12, 1969–1976. <https://doi.org/10.1111/j.1365-2486.2006.01193.x>
 - Mitsas, S., Golitsis, P., Khudoykulov, K., 2022. Investigating the impact of geopolitical risks on the commodity futures. *Cogent Economics & Finance* 10, 2049477. <https://doi.org/10.1080/23322039.2022.2049477>
 - Ντάφης, Σ., Κύρος, Γ., Λαγουβάρδος, Κ., 2022. Εξαιρετικά περιορισμένη η έκταση της χιονοκάλυψης στην Ελλάδα τον Δεκέμβριο 2022. Εθνικό Αστεροσκοπείο Αθηνών, 29-12-2022, Διαθέσιμο στη δ/ση: https://www.meteo.gr/article_view.cfm?entryID=2563
 - Olesen, J.E., Børjesson, C.D., Elsgaard, L., Palosuo, T., Rötter, R.P., Skjelveg, A.O., Peltonen-Sainio, P., Børjesson, T., Trnka, M., Ewert, F., Siebert, S., Brisson, N., Eitzinger, J., van Asselt, E.D., Oberforster, M., van der Fels-Klerx, H.J., 2012. Changes in time of sowing, flowering and maturity of cereals in Europe under climate change. *Food Additives & Contaminants: Part A* 29, 1527–1542. <https://doi.org/10.1080/19440049.2012.712060>
 - Piao, S., Liu, Q., Chen, A., Janssens, I.A., Fu, Y., Dai, J., Liu, L., Lian, X., Shen, M., Zhu, X., 2019. Plant phenology and global climate change: Current progresses and challenges. *Glob Change Biol* 25, 1922–1940. <https://doi.org/10.1111/gcb.14619>
 - Pietravalle, S., Shaw, M.W., Parker, S.R., van den Bosch, F., 2003. Modeling of Relationships Between Weather and Septoria tritici Epidemics on Winter Wheat: A Critical Approach. *Phytopathology* 93, 1329–1339. <https://doi.org/10.1094/PHYTO.2003.93.10.1329>
 - Porter, J.R., Gawith, M., 1999. Temperatures and the growth and development of wheat: a review. *European Journal of Agronomy* 10, 23–36. [https://doi.org/10.1016/S1161-0301\(98\)00047-1](https://doi.org/10.1016/S1161-0301(98)00047-1)
 - Prasad, P.V.V., Pisipati, S.R., Ristic, Z., Bukovnik, U., Fritz, A.K., 2008. Impact of Nighttime Temperature on Physiology and Growth of Spring Wheat. *Crop Sci.* 48, 2372–2380. <https://doi.org/10.2135/cropsci2007.12.0717>
 - Ronis, A. and Sema kien , R., 2006. Development of tan spot (*Pyrenophora tritici-repentis*) in winter wheat under field conditions. *Agronomy Research* 4(Special issue), 331–334. <https://agronomy.emu.ee/vol04Spec/p4S42.pdf>
 - Rötter, R.P., Palosuo, T., Pirttioja, N.K., Dubrovsky, M., Salo, T., Fronzek, S., Aikasalo, R., Trnka, M., Ristolainen, A., Carter, T.R., 2011. What would happen to barley production in Finland if global warming exceeded 4 °C? A model-based assessment. *European Journal of Agronomy* 35, 205–214. <https://doi.org/10.1016/j.eja.2011.06.003>
 - Royo, C., Soriano, J.M., Alvaro, F., 2017. Wheat: A Crop in the bottom of the Mediterranean diet pyramid, in: Fuerst-Bjellis, B. (Ed.), *Mediterranean Identities - Environment, Society, Culture*. InTech. <https://doi.org/10.5772/intechopen.69184>
 - Santeramo, F.G., Kang, M., 2022. Food Security Threats and Policy Responses in EU and Africa. *Sustainable Horizons* 4, 100044. <https://doi.org/10.1016/j.horiz.2022.100044>
 - Schierenbeck, M., Fleitas, M.C., Cortese, F., Golik, S.I., Simon, M.R., 2019. Nitrogen accumulation in grains, remobilization and post-anthesis uptake under tan spot and leaf rust infections on wheat. *Field Crops Research* 235, 27–37. <https://doi.org/10.1016/j.fcr.2019.02.016>
 - Semenov, M.A., 2009. Impacts of climate change on wheat in England and Wales. *J. R. Soc. Interface.* 6,

- 343–350. <https://doi.org/10.1098/rsif.2008.0285>
- Semenov, M.A., Stratonovitch, P., Alghabari, F., Gooding, M.J., 2014. Adapting wheat in Europe for climate change. *Journal of Cereal Science* 59, 245–256. <https://doi.org/10.1016/j.jcs.2014.01.006>
 - Simoglou, K.B., Dordas, C., 2006. Effect of foliar applied boron, manganese and zinc on tan spot in winter durum wheat. *Crop Protection* 25, 657–663. <https://doi.org/10.1016/j.cropro.2005.09.007>
 - Σίμογλου, Κ.Β., Δόρδας, Χ., Καρακάσης, Σ., 2007. Ο ψεκασμός με Β, Ζn, Μn καθυστερεί την εξέλιξη της κίτρινης κηλιδώσης τού σίτου. *Γεωργία-Κτηνοτροφία* 1, 66–69.
 - Sohag, K., Islam, M.M., Tomas Žikovi, I., Mansour, H., 2022. Food inflation and geopolitical risks: analyzing European regions amid the Russia-Ukraine war. *BFJ*. <https://doi.org/10.1108/BFJ-09-2022-0793>
 - Supit, I., van Diepen, C.A., de Wit, A.J.W., Kabat, P., Baruth, B., Ludwig, F., 2010. Recent changes in the climatic yield potential of various crops in Europe. *Agricultural Systems* 103, 683–694. <https://doi.org/10.1016/j.agsy.2010.08.009>
 - Trnka, M., Brazdil, R., Olesen, J.E., Eitzinger, J., Zahradnik, P., Kocmankova, E., Dobrovolná, P., Čížek, P., Možný, M., Bartoňová, L., Hlavinka, P., Semerádová, D., Vala, H., Havlík, M., Horáková, V., Fischer, M., Žalud, Z., 2012. Could the changes in regional crop yields be a pointer of climatic change? *Agricultural and Forest Meteorology* 166–167, 62–71. <https://doi.org/10.1016/j.agrformet.2012.05.020>
 - Wainshilbaum, S.J., 1991. Effect of Temperature and Growth Stage of Wheat on Development of Leaf and Glume Blotch Caused by *Septoria tritici* and *S. nodorum*. *Plant Dis.* 75, 993. <https://doi.org/10.1094/PD-75-0993>
 - Wiese, M.V., 1991. *Compendium of Wheat diseases*, second edition. APS Press.
 - Wright, K.H., Sutton, J.C., 1990. Inoculum of *Pyrenophora tritici-repentis* in relation to epidemics of tan spot of winter wheat in Ontario. *Canadian Journal of Plant Pathology* 12, 149–157. <https://doi.org/10.1080/07060669009501018>
 - Xu, X.-M., Monger, W., Ritieni, A., Nicholson, P., 2007. Effect of temperature and duration of wetness during initial infection periods on disease development, fungal biomass and mycotoxin concentrations on wheat inoculated with single, or combinations of, *Fusarium* species. *Plant Pathology* 56, 943–956. <https://doi.org/10.1111/j.1365-3059.2007.01650.x>
 - Ye, Z., Qiu, X., Chen, J., Cammarano, D., Ge, Z., Ruane, A.C., Liu, L., Tang, L., Cao, W., Liu, B., Zhu, Y., 2020. Impacts of 1.5 °C and 2.0 °C global warming above pre-industrial on potential winter wheat production of China. *European Journal of Agronomy* 120, 126149. <https://doi.org/10.1016/j.eja.2020.126149>
 - Zanis, P., Kapsomenakis, I., Philandras, C., Douvis, K., Nikolakis, D., Kanellopoulou, E., Zerefos, C., Repapis, C., 2009. Analysis of an ensemble of present day and future regional climate simulations for Greece. *Int. J. Climatol.* 29, 1614–1633. <https://doi.org/10.1002/joc.1809>