УДК 575.17+58.02/009

HOW DO INFLORESCENCES OF *LUPINUS POLYPHYLLUS* (FABACEAE) RE-ESTABLISH THEIR POSITION AFTER ARTIFICIAL BENDING?

Glagoleva N.S.[1*], Volkova P.A.[1, 2], Medvedev A.A.[1***], Yavorskiy M.R.[1****]**

[1] Biological Departament, Moscow South-West School N 1543
[2] Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok
(https://orcid.org/0000–0002-3534–5792)
e-mail: *glagolevans@1543.msk.ru; **polina.an.volkova@gmail.com***aleksei.al.medvedev@gmail.com; ****m.quak.sidon@gmail.com

Received 09 October, 2025; revised February 04, 2026; accepted February 20, 2026

The correct position of the inflorescence is vital for the pollination success. Many plants have physiological reorientation mechanisms based on the effects of hormone auxin, which is secreted in apical meristems and induces negative gravitropism. The younger the inflorescence is, the more important it is to restore its verti-cal position in the fastest possible way to maximize pollination success. Thus, we investigated the effect of the absence of inflorescence's apical part and inflorescence age on its reorientation and position of bending point. As an object of investigation, the invasive *Lupinus polyphyllus* was chosen, since the position of the flowers along the axis makes the plant convenient for manipulation. Removal of the apex does not influence the restoration of orientation relatively to the ground. Younger inflorescence tends to have a greater part of them reoriented. The reoriented part of inflorescence mainly contained unopened or partly opened flowers at the moment of the initial bending by experimenters.

Key words: auxin, field experiments, negative gravitropism, plant reorientation, pollination.
DOI: 10.35885/1996-1499-19-1-157-158

Full text of the paper is published in Russian Journal of Biological Invasions. DOI: 10.31857/S207511172104XXXYYY

REFERENCES

Alyokhina, N.D, Balnokhin, Yu.V., Gavrilenko, V.F., Zhigalova, T.V., Meichik, N.R. Nosov, A.M. Polesskaya, O.G., Kharitonoshvili, E.V., and Chub, V.V., *Plant physiology*. Moscow: Akademia, 2005. [in Russian].

Armbruster, W.S. and Muchhala, N., Floral reorientation: the restoration of pollination accuracy after accidents, *New Phytologist*, 2020, vol. 227, pp. 232–243. https://doi.org/10.1111/nph.16482

Bastien, R., Bohr, T., Moulia, B., and Douady, S., Unifying model of shoot gravitropism reveals proprioception as a central feature of posture control in plants, *Proceedings of the National Academy of Sciences of the United States of America*, 2013, vol. 110, pp. 755–760. https://doi.org/10.1073/pnas.1214301109

Blancaflor, E.B. and Masson, P.H., Plant gravitropism: unraveling the ups and downs of a complex process, *Plant Physiology*, 2003, vol. 133, pp. 1677–1690. https://doi.org/10.1104/pp.103.032169

Chauvet, H., Moulia, B., Legué, V., Forterre, Y., and Pouliquen, O., Revealing the hierarchy of processes and time-scales that control the tropic response of shoots to gravi-stimulations, *Journal of Experimental Botany*, 2019, vol. 70, pp. 1955–1967. https://doi.org/10.1093/jxb/erz027

Chen, R., Rosen, E., and Masson, P.H., Gravitropism in higher plants, *Plant Physiology*, 1999, vol. 120, pp. 343–350. https://doi.org/10.1104/pp.120.2.343

Cucinotta, M., Cavalleri, A., Chandler, J.W., and Colombo, L., Auxin and flower development: a blossoming field, *Cold Spring Harbor Perspectives in Biology*, 2021, vol. 13, a039974. https://doi.org/10.1101/cshperspect.a039974

Eckstein, R.L., Welk, E., Klinger, P.Y., Lennartsson, T., Wissman, J., Ludewig, K., Hansen, W., and Ramula, S., Biological flora of Central Europe – *Lupinus polyphyllus* Lindley, *Perspectives in Plant Ecology, Evolution and Systematics*, 2023, vol. 58, 125715. https://doi.org/10.1016/j.ppees.2022.125715

Kempe, A., Lautenschläger, T., and Neinhuis, C., Reorientation in tilted stems of papaya by differential growth, *International Journal of Plant Science*, 2014, vol. 175, pp. 537–543. https://doi.org/10.1086/675694

Kiss, J.Z. Mechanisms of the early phases of plant gravitropism, *Critical Reviews in Plant Sciences*, 2000, vol. 19, pp. 551–573. https://doi.org/10.1080/07352680091139295

Levernier, N., Pouliquen, O., and Forterre, Y., An integrative model of plant gravitropism linking statoliths position and auxin transport, *Frontiers in Plant Sciences*, 2021, vol. 29, 651928. https://doi.org/10.3389/fpls.2021.651928

Santner, A., Calderon-Villalobos, L.I., and Estelle, M., Plant hormones are versatile chemical regulators of plant growth, *Nature Chemical Biology*, 2009, vol. 5, pp. 301–307. https://doi.org/10.1038/nchembio.165

Teale, W.D., Paponov, I.A., and Palme, K., Auxin in action: signaling, transport and the control of plant growth and development, *Nature Reviews Molecular Cell Biology*, 2006, vol. 7, pp. 847–859. https://doi.org/10.1038/nrm2020

Tsugawa, S., Kanda, N., Nakamura, M., Goh, T., Ohtani, M., and Demura, T., Spatio-temporal kinematic analysis of shoot gravitropism in *Arabidopsis thaliana*, *Plant Biotechnology*, 2020, vol. 37, pp. 443–450. https://doi.org/10.5511/plantbiotechnology.20.0708a

Wang, H., Tie, S., Yu, D., Guo, Y-H., and Yang C-F., Change of floral orientation within an inflorescence affects pollinator behavior and pollination efficiency in a bee-pollinated plant, *Corydalis sheareri*, *PLoS ONE*, 2014, vol. 9, e95381. https://doi.org/10.1371/journal.pone.0095381

Woodward, A.W. and Bartel, B., Auxin: regulation, action, and interaction, *Annals of Botany*, 2005, vol. 95, pp. 707–735. https://doi.org/10.1093/aob/mci083