Publication list FLORSYS

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# Synthetic papers

1. Colbach N., Colas F., Cordeau S., Maillot T., Moreau D., Queyrel W., Villerd J. (**2021**) The FLORSYS crop-weed canopy model, a tool to investigate and promote agroecological weed management. Field Crops Research 261:108006, <https://doi.org/10.1016/j.fcr.2020.108006>
2. Colbach N., Biju-Duval L., Gardarin A., Granger S., Guyot S. H. M., Mézière D., Munier-Jolain N. M. & Petit S. (**2014**) The role of models for multicriteria evaluation and multiobjective design of cropping systems for managing weeds. *Weed Research* **54**, 541–555
3. Colbach N. (**2020**) How to use a “virtual field” to evaluate and design integrated weed management strategies at different spatial and temporal scales. In: Decision Support Systems for Weed Management (G. R. Chantre & J. L. González-Andújar, eds.) Springer International Publishing, p. 227-248. DOI: 10.1007/978-3-030-44402-0\_11
4. **2025**) La complémentarité des outils d'accompagnement des acteurs pour la gestion des adventices économe en herbicides. Innovations Agronomiques 101, 119-134. https://dx.doi.org/10.17180/ciag-2025-vol101-art11
5. Colbach N., Cordeau S., Queyrel W., Maillot T., Villerd J. & Moreau D. (**2019**) Du champ virtuel au champ réel - ou comment utiliser un modèle de simulation pour diagnostiquer des stratégies de gestion durables des adventices? Agronomie, Environnement et Sociétés 9:111-128, <https://agronomie.asso.fr/aes-9-2-14> (sur invitation)

Colbach N., Angevin F., Baquet A., Gauguery A., Flament M., Moreau D. (**2024**) Organisation du colloque final du projet COPRAA dans le cadre d'un carrefour de l’innovation Connaissances et outils pour des démarches préventives et opérationnelles en gestion agroécologique des adventices. 26–27 nov 2024 à Dijon. Les 28 exposés (diapos, replay des vidéos) sur <https://ciag.hub.inrae.fr/carrefours-de-l-innovation-agronomique/copraa>.

# Details on model structure & content

1. Maillot T., Vioix J.-B. & Colbach N. (2023) Site-specific herbicide spraying can control weeds as well as full spraying in the long-term. A simulation study. *Computers and Electronics in Agriculture* 214, 108338, https://doi.org/10.1016/j.compag.2023.108338
2. Perthame L., Petit S., Colbach N. (**2023**) Modelling weed seed predation by carabids and its effects on crop production under contrasted farming systems. *European Journal of Agronomy* 151, 126953. doi.org/10.1016/j.eja.2023.126953
3. Moreau D., Pointurier O., Beaudoin N., Perthame L., Villerd J., Colbach N. (**2021**) Integrating plant-plant competition for nitrogen into a 3D individual-based model simulating the effects of cropping systems on weed dynamics. Field Crops Research 268, 108166 https://doi.org/10.1016/j.fcr.2021.108166
4. Pointurier O., Gibot-Leclerc S., Moreau D., Reibel C., Vieren E. & Colbach N. (**2021**) Designing a model to investigate cropping systems aiming to control both parasitic plants and weeds. European Journal of Agronomy, 126318. https://doi.org/10.1016/j.eja.2021.126318
5. Pointurier O., Moreau D., Pagès L., Caneill J., Colbach N. (**2021**) Individual-based 3D modelling of root systems in heterogeneous plant canopies at the multiannual scale. Case study with a weed dynamics model. Ecological Modelling 440: 109376, <https://doi.org/10.1016/j.ecolmodel.2020.109376>
6. Colbach N., Chauvel B., Messéan A., Villerd J. & Bockstaller C. (**2020**) Feeding pollinators from weeds could promote pollen allergy. A simulation study. Ecological Indicators 117 (13 pages): 106635, https://doi.org/10.1016/j.ecolind.2020.106635
7. Colbach N, Moreau D, Dugué F, Gardarin A, Strbik F, Munier-Jolain N (**2020**) The response of weed and crop species to shading. How to predict their morphology and plasticity from species traits and ecological indexes? European Journal of Agronomy 121: 126158 (18 pages), <https://doi.org/10.1016/j.eja.2020.126158>
8. Colbach N., Cordeau S., Garrido A., Granger S., Laughlin D., Ricci B., Thomson F. & Messéan A. (**2018**) Landsharing vs landsparing: how to reconcile crop production and biodiversity? A simulation study focusing on weed impacts. Agriculture, Ecosystems & Environment 251, 203-2017, doi.org/10.1016/j.agee.2017.09.005
9. Colbach N., Bockstaller C., Colas F., Gibot-Leclerc S., Moreau D., Pointurier O. & Villerd J. (**2017**) Assessing weed-mediated broomrape risk in cropping systems with a simulation-based indicator. Ecological Indicators 82, 280–292, dx.doi.org/10.1016/j.ecolind.2017.05.070
10. Colbach N., Fernier A., Le Corre V., Messéan A. & Darmency H. (**2017**) Simulating changes in cropping practices in conventional and glyphosate-resistant maize. I. Effects on weeds. Environmental Science and Pollution Research 24, 11582-11600 (dx.doi.org/10.1007/s11356-017-8591-7)
11. Colbach, N., Bertrand, M., Busset, H., Colas F., Dugué, F., Farcy, P., Fried, G., Granger, S., Meunier, D., Munier-Jolain, N., Noilhan, C., Strbik, F., Gardarin, A. (**2016**) Uncertainty analysis and evaluation of a complex, multi-specific weed dynamics model with diverse and incomplete data sets. Environmental Modelling & Software, 86, 184-203 (<http://dx.doi.org/10.1016/j.envsoft.2016.09.020>)
12. Mézière D., Petit S., Granger S., Biju-Duval L., Colbach, N. (**2015**) Developing a set of simulation-based indicators to assess harmfulness and contribution to biodiversity of weed communities in cropping systems. *Ecological indicators* **48**, 157-170
13. Colbach N., Collard A., Guyot S.H.M., Mézière D., Munier-Jolain N.M. (**2014**) Assessing innovative sowing patterns for integrated weed management with a 3D crop:weed competition model. European Journal of Agronomy **53**, 74-89
14. Colbach N., Busset H., Roger-Estrade J., Caneill J. (**2014**) Predictive modelling of weed seed movement in response to superficial tillage tools. *Soil & Tillage Research* **138**, 1–8
15. Munier-Jolain N.M., Collard A., Busset H., Guyot S.H.M., Colbach N. (**2014**) Modelling the morphological plasticity of weeds in multi-specific canopies. *Field Crops Research* **155**, 90-98
16. Colbach N., Tschudy C., Meunier D., Houot S., Nicolardot B. (**2013**) Weed seeds in exogenous organic matter and their contribution to weed dynamics in cropping systems. A simulation approach. *European Journal of Agronomy* **45**, 7-19
17. Mézière D., Lucas P., Granger S., Colbach N.(**2013**)Does integrated weed management increase the risk of soil-borne crop diseases? Simulation case study with a grass weed and a soil-borne cereal disease. *European Journal of Agronomy* **47**, 33-43
18. Munier-Jolain N.M., Guyot S.H.M., Colbach N. (**2013**) A 3D model for light interception in heterogeneous crop:weed canopies. Model structure and evaluation. *Ecological Modelling* **250**, 101-110
19. Gardarin A., Dürr C., Colbach N. (**2012**) Modelling weed seed bank dynamics and emergence with species traits. *Ecological Modelling* **240**, 123-138
20. Colbach N., Kurstjens D.A.G., Munier-Jolain N.M., Dalbiès A., Doré T. (**2010**) Assessing non-chemical weeding strategies through mechanistic modelling of blackgrass (*Alopecurus myosuroides* Huds.) dynamics. *European Journal of Agronomy* **32**, 205-218
21. Roger-Estrade J., Colbach N., Leterme P., Richard G. & Caneill J. (**2001**) Modelling vertical and lateral weed seed movements during mouldboard ploughing with a skim-coulter. *Soil Tillage Research* **63**, 35-49
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# Simulation studies

1. Lebreton P., Moreau D., Perronne R. & Colbach N. (**2025**) Tracking ideal varieties for agroecological weed management in organic wheat. A simulation study. European Journal of Agronomy 164, 127501, <https://doi.org/10.1016/j.eja.2024.127501> (open access)
2. Lebreton P., Bedoussac L., Bonnet C., Journet E.-P., Justes E. & Colbach N. (**2024**) Optimal species proportions, traits and sowing patterns for agroecological weed management in legume-cereal intercrops. European Journal of Agronomy 159, 127266, <https://doi.org/10.1016/j.eja.2024.127266> (open access)
3. Cavan N., Omon B., Tailleur A., Dubois S., Queyrel W., Van Inghelandt B., Colbach N. (**2023**) Model-based evaluation in terms of weed management and overall sustainability of cropping systems designed with three different approaches. *Agricultural Systems* 208:103637. <https://doi.org/10.1016/j.agsy.2023.103637>
4. Maillot T., Vioix J.-B. & Colbach N. (2023) Site-specific herbicide spraying can control weeds as well as full spraying in the long-term. A simulation study. *Computers and Electronics in Agriculture* 214, 108338, https://doi.org/10.1016/j.compag.2023.108338
5. Queyrel W., Van Inghelandt B., Colas F., Cavan N., Granger S., Guyot B., Reau R., Derouch D., Chauvel B., Maillot T. & Colbach N. (**2023**) Combining expert knowledge and models in participatory workshops with farmers to design sustainable weed management strategies. *Agricultural Systems* 208:103645. https://doi.org/10.1016/j.agsy.2023.103645
6. Colbach N., Felten E., Gée C., Klein A., Lannuzel L., Lecomte C., Maillot T., Strbik F., Villerd J. & Moreau D. (**2022**) Tracking ideal varieties and cropping techniques for agroecological weed management: a simulation-based study on pea. *Frontiers in Plant Science* 13, 809056 (23 p), http://doi.org/10.3389/fpls.2022.809056
7. Colbach N. & Cordeau S. **(2022**) Are no-till herbicide-free systems possible? A simulation study. *Frontiers in Agronomy* 4, 823069 (21 p), 10.3389/fagro.2022.823069 (open access)
8. Pointurier O., Gibot-Leclerc S., Moreau D. & Colbach N. (**2021**) How to pit weeds againt parasitic plants. A simulation study with *Phelipanche ramosa* in arable crops. European Journal of Agronomy, 130, 126368, https://doi.org/10.1016/j.eja.2021.126368
9. Moreau D., Pointurier O., Nicolardot B., Villerd J., Colbach N. (**2020**) In which cropping systems can residual weeds reduce nitrate leaching and soil erosion? European Journal of Agronomy 119: 126158, https://doi.org/[10.1016/j.eja.2020.126015](https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1016%2Fj.eja.2020.126015?_sg%5B0%5D=OfxBkoTan4Ptk_Nlo0Flyvb5rDt4hONuJfzHu1ZGwBxrjWH1j-zb0pnfktXwv362-zxxnOteh9XBKzCrnwisY8cWsQ.Lmi58ns1vjJhLpZnJYqXnfiTKPFvpctPTIRx2H1EwQLLQfbcQHkPGj2dmxbV7kHtGbtsUc_YdEDQvecPeHZydw)
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14. Colbach N., Darmency H., Fernier A., Granger S., Le Corre V. & Messéan A. (**2017**) Simulating changes in cropping practices in conventional and glyphosate-resistant maize. II. Effect on weed harmfulness and benefits. Environmental Science and Pollution Research 24(14), 13121-13135 dx.doi.org/10.1007/s11356-017-8796-9
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16. Bürger J., Darmency H., Granger S., Guyot S.H.M., Messéan A., Colbach N. (**2015**) Simulation study of the impact of changed cropping practices in conventional and GM maize on weeds and associated biodiversity. *Agricultural Systems* **137**, 51–63
17. Mézière D., Colbach N., Dessaint F., Granger S. (**2015**) Which cropping systems to reconcile weed-related biodiversity and crop production in arable crops? An approach with simulation-based indicators. *European Journal of Agronomy* 68, 22-37 10.1111/wre.12121
18. Colbach N., Granger S., Guyot S.H.M., Mézière D. (**2014**) A trait-based approach to explain weed species response to agricultural practices in a simulation study with a cropping system model. *Agriculture, Ecosystems and Environment* **183**, 197-204
19. Mézière D., Lucas P., Granger S., Colbach N.(**2013**)Does integrated weed management increase the risk of soil-borne crop diseases? Simulation case study with a grass weed and a soil-borne cereal disease. *European Journal of Agronomy* **47**, 33-43

# DeciFlorSys & OptiFlorSys papers

1. Colas F, Cordeau S., Granger S., Jeuffroy M.-H., Pointurier O., Queyrel W., Rodriguez A., Villerd J., Colbach N. (**2020**) Co-development of a decision support system for integrated weed managment: contribution from future users. European Journal of Agronomy 114, 126010 <https://doi.org/10.1016/j.eja.2020.126010>
2. Queyrel W., Van Inghelandt B., Colas F., Cavan N., Granger S., Guyot B., Reau R., Derouch D., Chauvel B., Maillot T. & Colbach N. (**2023**) Combining expert knowledge and models in participatory workshops with farmers to design sustainable weed management strategies. *Agricultural Systems* 208:103645. https://doi.org/10.1016/j.agsy.2023.103645
3. **2025**) La complémentarité des outils d'accompagnement des acteurs pour la gestion des adventices économe en herbicides. Innovations Agronomiques 101, 119-134. https://dx.doi.org/10.17180/ciag-2025-vol101-art11
4. Maillot T., Chanis M., Cavan N., Perthame L., Queyrel W., Villerd J., Vioix J.-B. & Colbach N. (**2025**) OPTIFLORSYS : Un outil pour aider à la conception de stratégies de gestion d'adventices agroécologiques. Innovations Agronomiques 101, 149-162. https://dx.doi.org/10.17180/ciag-2025-vol101-art13