Food Systems Ecology
SFS 3591

Syllabus
4 credits

The School for Field Studies (SFS)
Center for Sustainable Food Systems
Greve, Chianti, Italy

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.

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COURSE CONTENT SUBJECT TO CHANGE

Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;
- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;
- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that may present. In other words, the elephants are not always where we want them to be, so be flexible!

Course Overview

It is estimated that most of global terrestrial biodiversity loss is related to food production. Food systems account for around 25% of the global greenhouse gas emissions and an estimated 33% of soils are moderate to highly degraded due to erosion, nutrient depletion, acidification, salinization, compaction, and chemical pollution.

This course focuses on the ecology of food systems and on the impact of food production on biodiversity and natural resources and their management and how to try to mitigate this impact. This framework provides a comprehensive approach to examining complex ecological relationships between agricultural practices and agro-ecosystem ecological state, drawing on the disciplines of natural sciences, biology, ecology, and climate.

The course provides theoretical and practical knowledge and skills needed to undertake research on biodiversity conservation in agro-ecosystems. By working at ecosystem and species community level, students will learn planning, the use of monitoring techniques and data gathering, analysis, interpretation, and communication of results.

Students will have the opportunity to visit different agro-environments as well as explore the surrounding natural habitats, experiencing the close interaction between the different habitats that characterize these ecosystems, conducting a direct experience of field research. The practical lessons will take place in three different areas of Tuscany. The first, in Chianti, located in central Tuscany, is a hilly system mainly suited to the cultivation of vine and olive trees mixed with woodland; the second, in Mugello, an agricultural and forested area a few km north of Florence, gateway to the Apennines, a valley surrounded by hills and mountains, famous for its pastures, agroforestry crops and its chestnut groves, a typical cultivation of the Tuscan Apennines and of the adjacent Casentino, characterized by large forests; the third, in Maremma, extends from the coast through large reclaimed wetlands used for agriculture interspersed with lagoons, as well as several coastal fossil islands with Mediterranean macchia and holm oak woods.

Learning Objectives

Upon completion of the course students will be able to:

- Understand the importance of preserving biodiversity in agro-ecosystems.
- Analyze the complex ecosystem relationships and equilibria.
- Perform fieldwork and field data collection.
- Assess state indicators and pressure indicators in agro-ecosystems.
- Identify agro-environmental measures to support conservation of biodiversity.

Assessment

The evaluation breakdown for the course is as follows:

Assessment Item	Value (%)
Participation	10
Assessing personal habitat and familiar landscapes	10
FEX 1: Identifying agro-ecosystems and nearby natural and semi-natural habitats	15
FEX 2: Identify state and pressure indicators	20
Student led discussion: Can sustainable agro-environments conserve biodiversity?	20
Final Exam	25
TOTAL	**100**

Participation (10%)

Every student should be prepared for each academic session. This implies reading the materials for each session in enough detail to be able to ask relevant questions; and to participate in analytical discussions about the key issues. Active participation during classes, discussions, assignments, and hikes is expected. Participation will be assessed against active listening, engagement with course material including required readings, asking and answering question during classes, and the frequency, consistency and originality of contributions in class discussion.

Assessing personal habitat and familiar landscapes (10%)

In a 1000-1200-word paper, describe where you live in the US, the type of surroundings, landscape, and your access to nature in rural and urban areas of your surroundings. Assess how you interact with nature, where evidence of agriculture is and explain how your habitat affects your lifestyle, your physical and mental wellbeing. Explain your likes and dislikes pertaining to the habitat you live in. Describe your access to public transportation, airports, and other travel opportunities and how they facilitate your opportunity to move and travel. Describe your holiday destinations and contrast them to your habitat. How have your familiar surroundings been altered by human impacts? Have there been limitations on animal and plant dispersion. Consider what kind of landscape past generations in your family grew up in, how nature impacted their lives and if they had access to green areas, holidays, or leisure time, and contrasting landscapes. Consider how climate changes impact your natural habitat and explain how.

Field Exercise 1: Identifying agro-ecosystems and nearby natural and semi-natural habitats (15%)

This FEX will be carried out in agro-ecosystems in different landscapes (e.g., hilly, lowland areas) and will allow students to get familiar with the agro-ecosystems and nearby natural and semi-natural habitats. Carefully observing a habitat is of fundamental importance to identify and understand the interactions that take place both within the habitat itself and with the nearby habitats. Each identified habitat will be described qualitatively. Observing serves to develop sensibility and train intuition to identify possible sustainable solutions. Students will be guided in the process of observation and data collection and report writing. Each student will sample data in the field, make notes and take photographs. Student’s work will be assessed based on the correct identification of both type and quality of habitats.

Field Exercise 2: Identifying state and pressure indicators (20%)

Guided visits to farms will give the opportunity to put into practice what was learned during the previous field visits and discussed during class work. The two most widespread cultivations in Chianti are vineyards and olive groves. Indicators will be identified to assess the ecological state of vineyards and

olive groves the practices used in these cultivations and the relative impacts. Students will therefore be trained to identify state and pressure indicators and their work will be assessed on their identification skills, opinion on the level of sustainability achieved by the farm visited and on how to make it environmentally sustainable or maintain environmental sustainability.
Students will practice their skills recording field naturalistic data visiting farms and nearby land.

Student led discussion: Can sustainable agro-environments conserve biodiversity?
Food production is responsible for most of the biodiversity loss. Can sustainable food production practices support biodiversity and prevent water, soil, and air pollution? What could be a sustainable compromise between nature conservation and global food production? Each student will prepare a 10-minute presentation on future challenges to preserve environmental health, using the knowledge and information gained and reviewing the literature.

Final Exam (25%)
The final exam will consist of a written test that will require students to use the knowledge acquired based on the topics covered in the lectures, readings, field experiences and related discussions. The test will be based on five questions of which students will be able to choose two; the assignment will require students to think critically about the issues covered. Student work will be assessed on understanding of questions, appropriateness of answers, knowledge of relevant information, critical analytical skills, and logic in discussion, as well as a clear and relevant narrative.

Grading Scheme

A	95.00 - 100.00%	B+	86.00 - 89.99%	C+	76.00 - 79.99%	D	60.00 - 69.99%
A-	90.00 - 94.99%	B	83.00 - 85.99%	C	73.00 - 75.99%	F	0.00 - 59.99%
		B-	80.00 - 82.99%	C-	70.00 - 72.99%		

General Reminders

Readings – You are expected to have read all the assigned research articles prior to each class. All readings will be available as PDFs on the Student Drive. Readings might be updated or changed during the course of the semester. Not all material will be explicitly taught during lectures, material not covered in lectures will NOT be on exams. Supplemental readings are not mandatory but are recommended to expand your knowledge. Additional readings may be assigned.

Honor Code/Plagiarism – SFS places high expectations on their students and we hold students accountable for their behaviors. SFS students are held to the honor code below. SFS has a zero-tolerance policy towards student cheating, plagiarism, data falsification, and any other form of dishonest academic and/or research practice or behavior. Using the ideas or material of others without giving due credit is cheating and will not be tolerated. Any SFS student found to have engaged in or facilitated academic and/or research dishonesty will receive no credit (0%) for that activity.

"SFS does not tolerate cheating or plagiarism in any form. While participating in an SFS program, students are expected to refrain from cheating, plagiarism and any other behavior which would result in a student receiving credit for work which they did not accomplish on their own. Students are expected to report any instance of cheating or plagiarism by others."

Deadlines – Deadlines for written and oral assignments are instated to promote equity among students and to allow faculty ample time to review and return assignments before others are due. As such, deadlines are firm; extensions will only be considered under extreme circumstances. Late assignments will incur a penalty of 10% of your grade for each day you are late. After two days past the deadline, assignments will no longer be accepted. Assignments will be handed back to students after a one-week grading period. Grade corrections for any assessment item should be requested in writing at least 24 hours after assignments are returned. No corrections will be considered afterwards.

Content Statement – Every student comes to SFS with unique life experiences, which contribute to the way various information is processed. Some of the content in this course may be intellectually or emotionally challenging but has been intentionally selected to achieve certain learning goals and/or showcase the complexity of many modern issues. If you anticipate a challenge engaging with a certain topic or find that you are struggling with certain discussions, we encourage you to talk about it with faculty, friends, family, the HWM, or access available mental health resources.

Participation – Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the course is mandatory, it is important that you are prompt for all activities, bring the necessary equipment for field exercises and class activities, and simply get involved.

Course Content

Type: D: Discussion, **FL:** Field Lecture, **GL:** Guest Lecture, **L**: Lecture, **O**: Orientation, **FEX**: Field Exercise
*Readings in **Bold** are required.

No	*Title and outline*	*Type*	*Time (hrs)*	*Required Readings*
1	**Introduction to the course**	O	1.0	
2	**Introduction to Agro-ecology. Part 1** Application of ecological concepts and principles in agriculture	L	2.0	**Ribeiro et al. (2009).** **Lebeau et al. (2015).** **Norris (2008).** Dudley & Alexander (2017). Ghazoul (2020).
3	**Introduction to Agro-ecology. Part 2** Agriculture and biodiversity	L	2.0	
4	**Biodiversity in Agro-ecosystems** Brief introduction to plant and animal diversity in agro-ecosystems and how biodiversity can benefit agro-ecosystems.	L	2.0	**Feledyn-Szewczyk et al. (2015).** **Isbell et al. (2017).**
5	**A walk "in nature" at the Natural History Museum of the University of Florence** Students will visit one of the world's oldest natural history museums where they will observe "diversity" ordered taxonomically	FL	2.0	**Barbagli (2009).**

No	*Title and outline*	*Type*	*Time (hrs)*	*Required Readings*
6	**Identifying agro-ecosystems and nearby natural and semi-natural habitats** **Field observation and data collection** Creation of a field data collection sheet and recording of field data	L, FEX	3.0	**Biaggini & Corti (2021).**
7	**Natural History of the Study Areas: Tuscan Maremma** Coastal and wetland district. Biodiversity of the agro-ecosystems of the Tuscan Maremma. Agriculture, biodiversity, and landscape variety of a reclaimed territory interconnected with natural habitats.	L, FL	4.0	**Harrison et al. (2022).** https://parco-maremma.it
8	**Organic farming and Biodiversity** Does organic farming act positively on biodiversity?	FL, D	2.0	**Rundlöf et al. (2016).** **Tscharntke et al. (2021).**
9	**Identification of environmental functions** The loss of biodiversity negatively affects ecosystem processes and functions	L	2.0	**Meyer et al. (2018).**
10	**Natural history of the Casentino/Mugello areas** Mountain districts. Biodiversity of the Casentino/Mugello territories. Diversity of agro-pastoral systems in a mountain forest.	FL	2.0	**Corson et al. (2022).** Prati Pascoli paper https://www.parcoforestecasentinesi.it/en
11	**Wildlife and human activities** How human activities affect wildlife	L, FL	2.0	**Garcês et al. (2020).** Banaszak J. (1992).
12	**Natural History of Chianti** Hilly system in central Tuscany. Biodiversity: natural habitats versus agroecosystems. Past and present landscape patchiness.	FL	2.0	**Eckerter et al. (2022).** Biaggini et al. (2016).
13	**Identify state and pressure indicators: field observations in agroecosystems** Comparison between different agricultural and semi–natural land uses (e.g., olive tree plantations and vineyards).	FEX	2.0	**Biaggini & Corti (2015).** **Fasola et al. (2021).** Biaggini et al. (2009).
14	**Land manipulation and agricultural mechanization** Impact on soil and biodiversity.	GL, FL	2.0	**Bazzoffi (2009).** **Tsiafouli et al. (2015).** Biaggini et al. (2011).
15	**Transition towards sustainable practices** How to improve agro-environments to make them biodiversity friendly.	FL	2.0	**Manenti (2014).** **Biaggini et al. (2018).** **Staley et al. (2022).**
16	**Student led discussion** Can sustainable agro-environments conserve biodiversity?	D	2.0	**Batáry et al. (2015).**

No	Title and outline	Type	Time (hrs)	Required Readings
17	**Biodiversity and Agriculture in Sicily** Small island biodiversity and island agricultural practices	FL (Sicily)	4.0	**Lo Cascio et al. (2023).** **Vergamini et al. (2018).**
18	**Field observations in island Agro-ecosystems** Ancient and present vineyard management	FL, GL (Sicily)	4.0	**Nicolosi et al. (2010).**
19	**Environmental Minimum Requirements** How biodiversity copes with agricultural practices	L, FL	2.0	**Bastian et al. (2007).**
20	**Is wildlife-friendly farming possible?**	L, D	2.0	**Pywell et al. (2015).** **Natuhama (2022).**
21	**Biodiversity and Ecosystem Services** Biodiversity benefits the society does the society benefit biodiversity?	L	2.0	**Rey Benayas & Bullock (2012).** Schneiders et al. (2012). Mori et al. (2017).
22	**Functional and Aesthetic Qualities of ecological patchiness** How landscape pattern can influence the ecology of systems	FL, D	2.0	**Clergue et al. (2005).** **Tribot et al. (2018).**
23	**GIS and the prediction of occurrence of species** Can be GIS used to infer presence of species.	L	2.0	**Ray et al. (2002).** **https://education.nationalgeographic.org/resource/geographic-information-system-gis/**
24	**Exam Review**	D	1.0	
	Total		**53**	
	UMN Instructional Hours*		**63.6**	

**UMN defines an instructional hour as a 50-minute block. SFS syllabi are written in full 60-minute hours for programming purposes. Therefore 50 full hours = 60 UMN instructional hours (for four credit courses) and 25 full hours = 30 UMN instructional hours (for two credit courses).*

Reading List

*Readings in **Bold** are required

1. BANASZAK J., (1992). Strategy for conservation of wild bees in an agricultural landscape. *Agriculture, Ecosystems & Environment,* 40: 1-4.
2. **BARBAGLI F. (2009).** Genesi e sviluppo delle collezioni/The origin and development of the collections (pp. 56-74). In: Barsanti G. & Chelazzi G., Il Museo di Storia Naturale dell'Università di Firenze, The Museom of Natural History of the University of Florence, V0l. 1, Le Collezione de La Specola: Zoologia e Cere Anatomiche/The collections of La Specola: Zoology and Anatomical Waxes. Firenze University Press.
3. **BASTIAN O., CORTI C. & LEBBORONI M. (2007).** Determining environmental minimum requirements for functions provided by agro-ecosystems. *Agronomy for Sustainable Development*, 27: 1–13.
4. **BATÁRY P., DICKS L.V., KLEIJN D., SUTHERLAND W.J. (2015).** The role of agri-environment schemes in conservation and environmental management. *Conservation Biology,* 29 (4): 973-1254.

5. **BAZZOFFI P. (2009).** Soil erosion tolerance and water runoff control: minimum environmental standards. *Reg. Environ. Change*, 9:169–179.
6. BIAGGINI M., BAZZOFFI P., GENTILE R. & CORTI C. (2011). Effectiveness of the GAEC cross compliance standards, Rational management of set aside, Grass strips to control soil erosion and Vegetation buffers along watercourses on surface animal diversity and biological quality of soil. *Italian Journal of Agronomy*, 6(s1): 100-106.
7. BIAGGINI M., BERTI R. & CORTI C. (2009). Different habitat, different pressures? Analysis of the escape behaviour and ectoparasite load in *Podarcis sicula* (Lacertidae) populations in different agricultural habitats. *Amphibia-Reptilia*, 30 (4): 453-461.
8. **BIAGGINI M., CAMPETTI I. & CORTI C. (2018).** Breeding activity of the Agile Frog *Rana dalmatina* in a rural area. *Animal Biodiversity and Conservation*, 41 (2): 405-413.
9. **BIAGGINI M. & CORTI C. (2015).** Reptile assemblages across agricultural landscapes: where does biodiversity hide? *Animal Biodiversity and Conservation*, 38 (2): 163-174.
10. **BIAGGINI M. & CORTI C. (2021).** Occurrence of lizards in agricultural land and implications for conservation. *Herpetological Journal*, 31: 77-84; https://doi.org/10.33256/31.2.7784
11. BIAGGINI M., LO CASCIO P., BASSU, BAZZOFFI P., BARBAGLI F., NULCHIS V. & CORTI C. (2016). *Ecological focus area – EFA: the biological value of olive groves. A case study in Sardinia (Italy)*/ Ecological focus area - EFA: il valore biologico degli oliveti. Un caso di studio in Sardegna. *Italian Journal of Agronomy,* 10(s1):748 doi:10.4081/ija.2015.10.s1.748
12. **CLERGUE B., AMIAUD B., PERVANCHON F., LASSERRE-JOULIN F., PLANTUREUX S. (2005).** Biodiversity: function and assessment in agricultural areas. A review. *Agronomy for Sustainable Development*, 25(1),: 1-15. 10.1007/978-90-481-2666-8_21. hal-00886277
13. **CORSON, M. S., MONDIÈRE, A., MOREL, L., & VAN DER WERF, H. M. G. (2022).** Beyond agroecology: Agricultural rewilding, a prospect for livestock systems. *Agricultural Systems*, 199, 103410.
14. DUDLEY N. & ALEXANDER S. (2017). Agriculture and biodiversity: a review. *Biodiversity*, 18(2–3): 45–49.
15. **ECKERTER T., BRAUNISCH V., BUSE J., KLEIN A.M. (2022).** Open forest successional stages and landscape heterogeneity promote wild bee diversity in temperate forests. *Conservation Science and Practice*, 4:e12843. doi.org/10.1111/csp2.12843
16. **FASOLA E., BIAGGINI M., ORTIZ-SANTALIESTRA M.E., COSTA S., SANTOS B., LOPES I. & CORTI C. (2021).** Assessing Stress Response in Lizards from Agroecosystems with Different Management Practices. Bulletin of Environmental Contamination and Toxicology, https://doi.org/10.1007/s00128-021-03404-3
17. **FELEDYN-SZEWCZYK B., KUŚ J., STALENGA J., BERBEĆ A.K., RADZIKOWSKI P. (2015).** The Role of Biological Diversity in Agroecosystems and Organic Farming. In: Konvalina Petr (Ed.), Organic Farming - A Promising Way of Food Production. InTech Open.
18. **GARCÊS A., QUEIROGA F., PRADA J., PIRES I. (2020).** A review of the mortality of wild fauna in Europe in the last century: the consequences of human activity. Journal *of Wildlife and Biodiversity*, 4(2): 34-55.
19. GHAZOUL J. (2020). Ecology: a very short introduction. Oxford University Press.
20. **HARRISON P.A., BERRY P.M., SIMPSON G., HASLETT J.R., BLICHARSKA M., BUCUR M., DUNFORD R., EGOH B., GARCIA-LLORENTE M., GEAMĂNĂ N., GEERTSEMA W., LOMMELEN E., MEIRESONNE L., TURKELBOOM F. (2022).** Linkages between biodiversity attributes and ecosystem services: A systematic review. *Ecosystem Services*, 9: 191–203.
21. **ISBELL F.L. ADLER R.P., EISENHAUER N., FORNARA D., KIMMEL K., KREMEN C., LETOURNEAU D.K., LIEBMAN. M., POLLEY H.W., QUIJAS S., SCHERER-LORENZEN M. (2017).** Benefits of increasing plant diversity in sustainable agroecosystems. *Journal of Ecology*, 105: 871–879. doi: 10.1111/1365-2745.12789
22. KLEIN L.R., HENDRIX W.G., LOHR V.I., KAYTES J.B., SAYLER R.D, SWANSON M.E., ELLIOT W.J., REGANOLD J.P. (2015). Linking ecology and aesthetics in sustainable agricultural landscapes: Lessons from the Palouse region of Washington, U.S.A. *Landscape and Urban Planning,* 134: 195–209
23. **LEBEAU J., WESSELINGH RA., VAN DYCK H. (2015).** Butterfly Density and Behaviour in Uncut Hay Meadow Strips: Behavioural Ecological Consequences of an Agri-Environmental Scheme. *PLoS ONE*, 10(8): e0134945. doi:10.1371/journal. pone.0134945

24. **LO CASCIO P., PASTA S. & GUARINO R. (2023).** Natural History and Geography of the Aeolian Islands. Brief Guide for the 4th SIB Conference on Island Biology (2-7 July 2023, Lipari, Italy). Associazione Nesos & Edizioni Danaus, Lipari, 78 pp.

25. **MANENTI R. (2014).** Dry stone walls favour biodiversity: a case-study from the Appennines. Biodiversity and Conservation, 23: 1879–1893. DOI 10.1007/s10531-014-0691-9

26. **MEYER, S.T., PTACNIK, R., HILLEBRAND, H. et al. (2018).** Biodiversity–multifunctionality relationships depend on identity and number of measured functions. *Nat. Ecol. Evol*. 2: 44–49. https://doi.org/10.1038/s41559-017-0391-4

27. MORI A.S., LERTZMAN K.P., GUSTAFSSON L. (2017). Review: forest biodiversity and ecosystem services. Biodiversity and ecosystem services in forest ecosystems: a research agenda for applied forest ecology. Journal of Applied Ecology, 54: 12–27. doi: 10.1111/1365-2664.12669

28. NATUHARA Y. (2022). Conservation of endangered species in Japan's agroecosystems: focusing on specified class II nationally rare species of wild fauna/flora. *Landscape and Ecological Engineering*, 18: 309–320. https://doi.org/10.1007/s11355-021-00470-x

29. **NICOLOSI, A., TROMBY, F., STRAZZULLA, M., & CORTESE, L. (2018).** Wineries and agritouristic farms for sustainable development of the territory of the Aeolian Islands. *Economics of Agriculture*, 57(Spec.num.2): 311–318. Retrieved from https://ea.bg.ac.rs/index.php/EA/article/view/950

30. **NORRIS K. (2008).** Agriculture and biodiversity conservation: opportunity knocks. *Conservation Letters*, 1: 2–11.

31. **PYWELL R.F., HEARD M.S., WOODCOCK B.A., HINSLEY S., RIDDING L., NOWAKOWSKI M., BULLOCK J.M. (2015).** Wildlife-friendly farming increases crop yield: evidence for ecological intensification. *Proc. R. Soc. B,* 282: 20151740. http://dx.doi.org/10.1098/rspb.2015.1740

32. **RAY N., LEHMANN A., JOLY P. (2002).** Modeling spatial distribution of amphibian populations: a GIS approach based on habitat matrix permeability. *Biodiversity and* Conservation, 11: 2143–2165.

33. **REY BENAYAS J.M., BULLOCK J.M. (2012).** Restoration of Biodiversity and Ecosystem Services on Agricultural *Land. Ecosystems*, 15: 883–899. https://doi.org/10.1007/s10021-012-9552-0

34. **RIBEIRO R., SANTOS X., SILLERO N., CARRETERO M.A., LLORENTE G.A. (2009).** Biodiversity and Land uses at a regional scale: Is agriculture the biggest threat for reptile assemblages? *Acta Oecologica*, 35(2): 327-334.

35. **RUNDLÖF M., SMITH H.G. & BIRKHOFER K. (2016).** Effects of Organic Farming on Biodiversity. eLS. John Wiley & Sons, Ltd: Chichester. DOI: 10.1002/9780470015902.a0026342

36. SCHNEIDERS A., VAN DAELE T., VAN LANDUYT W., VAN REETH W. (2012). Biodiversity and ecosystem services: Complementary approaches for ecosystem management? *Ecological Indicators*, 21: 123–133.

37. **STALEY J.T., WOLTON R., NORTON L.R. (2022).** Improving and expanding hedgerows—Recommendations for a semi-natural habitat in agricultural landscapes. *Ecological Solutions and* Evidence, DOI: 10.1002/2688-8319.12209

38. **TRIBOT A.-S., DETER J., MOUQUET N. (2018).** Integrating the aesthetic value of landscapes and biological diversity. *Proc. R. Soc. B*, 285: 20180971. http://dx.doi.org/10.1098/rspb.2018.0971

39. **TSCHARNTKE T., GRASS I., WANGER T.C., WESTPHAL C. & BATÁRY P. (2021).** Beyond organic farming – harnessing biodiversity-friendly landscapes. *Trends in Ecology & Evolution,* Vol. 36, No. 10.

40. **TSIAFOULI M.A., THÉBAULT E., SGARDELIS S.P., DE RUITER P.C., VAN DER PUTTEN W.H., BIRKHOFER K., HEDLUND K. (2015).** Intensive agriculture reduces soil biodiversity across Europe. *Glob. Change Biol.* 21(2): 973–985.

41. **VERGAMINI D., VLAHOS G., PROSPERI P., BARTOLINI F., BRUNORI G. (2018).** Exploring the path of wine sustainability in isolated and limited production systems. A comparative analysis between two islands, Elba (Italy) and Santorini (Greece). In: 13th European International Farming Systems Association (IFSA) Symposium, Farming systems: facing uncertainties and enhancing opportunities, 1-5 July 2018, Chania, Crete, Greece. International Farming Systems Association (IFSA) Europe, 2018. p. 1-14.