Sveučilište u Zagrebu Agronomski fakultet
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Yield formation in arable crops (152078)

Nositelj predmeta

prof. dr. sc. Zlatko Svečnjak

Opis predmeta

Module focuses on ecological and environmental factors that affect and limit growth, development and yield formation of cultivated crops. It explains the complex relationships between agricultural practices and operations and environmental factors influencing the quality and yield build-up of arable crops under various soil and climate conditions. Topics include: Crop management changes for modern agricultural production, Dry matter accumulation activities of World crops and relation to potential productivity, Contribution of plant breeding and agricultural practices and operations to increased yields, Influence of radiation and temperature on crop growth and development, Cultivar specific growth and development, Leaf area and its relationship to maximum yields, Soil factors associated with yield formation, Influence of environmental stresses on the productivity of arable crops, Analysis of yield components in grain and forage crops, Further opportunities for increasing the yields of agricultural crops. Course content is intended to encourage student independence of thought, al well as advancement in literacy and written communication. Therefore, a comprehensive, research analysis paper on a yield formation of a selected arable crop, as agreed upon by the lecturer and the student, is required.

ECTS: **3.00**

Engleski jezik: **R1**

E-učenje: **R1**

Sati nastave: 30
Predavanja: 18
Vježbe u praktikumu: 2
Seminar: 10

Ocjenjivanje

Dovoljan (2):
Dobar (3):
Vrlo dobar (4):
Izvrstan (5):

Vrsta predmeta

- Graduate studies / MS Courses taught in English (Izborni predmet, 2. semestar, 1. godina)

Oblici nastave

- Lectures
- Consultations
- Laboratory practice/exercises
- Practicum
- Field work
- Seminars

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Ishodi učenja i način provjere

Ishod učenja	Način provjere
Ability to understand and describe the importance of developments and issues impacting arable crop production during the past 50 years.	written exams, final examination
Knowledge and understanding how plant adaptations to environment affect crop selection, growth and yield, and to describe crop responses to radiation quality, quantity and photoperiod, to describe plant adaptation and acclimation to temperature, soil limiting factors, to understand crop and cultivar specific responses to environmental stresses and crop adaptation and acclimation to precipitation.	written exams, final examination and research analysis paper
Competence for the synthesis of knowledge in the field of crop production and their use in efficient farm management.	written exams
Ability to plan and recommend major cropping operations in the process of agricultural production at the level of plant species and cultivar.	written exams, final examination and research analysis paper
Skills and basic knowledge how to conduct yield component analysis in grain and forage crops to assess the impact of agricultural practices and operations as well as growing conditions on yield build-up and quality.	written exams, final examination
Ability to gather relevant information from the literature.	research analysis paper
Competence to present information and problems about yield formation to general audience.	final examination

Način rada

Obveze nastavnika

All Powerpoint presentations supporting the lectures will be posted to students.

Obveze studenta

Field work and practicum attendance is compulsory. In class attendance is expected. The final class grade consists of two written exams (50%), final examination (25%) and research analysis paper (25%). Make-up exams will be given only if the regularly scheduled exam is missed because of an excused absence. The research analysis paper will be tested for inappropriate use of existing publications and other materials.

Polaganje ispita

Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
Two written exams	25%	0-59% 60-70% 71-80% 81-90% 91-100%	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)			

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Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
Final examination	25%	0-59% 60-70% 71-80% 81-90% 91-100%	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)			
Research analysis paper	25%	0-59% 60-70% 71-80% 81-90% 91-100%	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)			

Tjedni plan nastave

1. Crop management changes for modern agricultural production. A list od developments and issues impacting crop management and ecology during the past 50 years.
2. Dry matter accumulation activities of world crops and relation to potential productivity. The photosynthetic mechanism and its efficiency. Potential and maximum observed productivity for field crops.
3. Contribution of plant breeding and agricultural practices and operations to increased yields. Yield changes for the most important agricultural crops (wheat, rice, corn, soybean, etc.) in the world and Croatia in the past century as a result of plant breeding and improved agricultural practices and operations.
4. Influence of radiation and temperature on crop growth and development. Climate, growing season and crop production. Geographic distribution of arable crops. The role of radiation (quality and quantity) and photoperiod for crop growth and development.
5. The role of temperature for crop growth and development. Accumulation of heat units during the growing season. Methods for calculating heat units.
6. Cultivar specific growth and development. Leaf area and its relationship to maximum yields. Cultivar effect on plant growth and development, and final crop yield. Differences in the optimum leaf area index for the specific end-use of field and forage crops.
7. The effects of standing density and sowing date on the crop photosynthetic activity and yield potentials. Nitrogen impact on the development of leaf area index and final crop yield.
8. Soil factors associated with yield formation. Alternation of soil by men. Loss of soil organic matter and nitrogen. Root growth, excessive bulk density and soil strength.
9. Influence of environmental stresses on the productivity of arable crops. Tillage pans. Crop and cultivar specific responses to environmental stresses (soil acidity, diseases, pests, weeds, salinity, and nutrient deficiency).
10. Crop and cultivar specific responses to environmental stresses (continued). Water stress and deficit in crop production. The impact of water shortage in a given developmental stages on yield and yield components of field crops.
11. The impact of water shortage in a given developmental stages on yield and yield components of field crops.
12. Analysis of yield components in grain and forage crops. Representative sampling for yield component analyses under field conditions.
13. Yield components analysis of grain and forage crops.
14. Further opportunities for increasing the yields of agricultural crops. Research analysis paper about the opportunities to further increase the yield of a given crop/cultivar.
15. Further opportunities for increasing the yields of agricultural crops (continued). Research analysis paper about the opportunities to further increase the yield of a given crop/cultivar.

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Obvezna literatura

1. Sinclair, T.R., A. Weiss. 2010. Principles of Ecology in Plant Production. 2nd Edition. CAB International
2. Petr, J., V.Cerny, L. Hruska. 1988. Yield Formation in the Main Field Crops. Elsevier Sci. Publ. Co, New York, NY.
3. Evans, L.T. (ed.). 1975. Crop Physiology: Some case histories. Cambridge Univ. Press. New York, N.Y.
4. Satorre, E.H.,G.A. Slafer (ed.). 1999. Wheat: Ecology and physiology of yield determination. Food Products Press, New York, NY.
5. Fageria, N.K. 1992. Maximizing crop yields. Marcel Dekker, New York, NY.

Preporučena literatura

1. Hay, R.K.M., A.J. Walker. 1989. An Introduction to the Physiology of Crop Yield. Longman Scientific & Technical and John Wiley & Sons.
2. Smith, D.L., C. Hamel (eds.). 1999. Crop Yield Physiology and Processes. Springer.

Sličan predmet na srodnim sveučilištima

- Yield Formation in the Field Crops, Mendel University in Brno
- Management of Crop Production, Yield Formation and Quality, Slovak University of Agriculture in Nitra