

# IX INTERNATIONAL SYMPOSIUM ON AGRICULTURAL SCIENCES

24<sup>th</sup> September 2020  
Banja Luka  
Bosnia and Herzegovina

## BOOK OF ABSTRACTS



# AGRORES 2020



## BOOK OF ABSTRACTS

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IX INTERNATIONAL SYMPOSIUM ON  
AGRICULTURAL SCIENCES



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24 September, 2020  
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Bosnia and Herzegovina

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# **SYMPOSIUM PROGRAM**



	<b>Thursday, September 24, 2020</b>
	<b>Participation online via the Google Meet platform</b>

<i>Time</i>	
09:00 – 09:30	<b>Opening remarks</b>
	Welcome address by: <ul style="list-style-type: none"> <li>- Zlatan Kovačević, PhD, Dean of Faculty of Agriculture, University of Banja Luka;</li> <li>- Boris Pašalić, PhD, Minister of Agriculture, Forestry and Water Management of the Republic of Srpska;</li> <li>- Željko Vaško, PhD, President of the Organizing Committee;</li> </ul>
	<i>Plenary session</i>
	<i>Moderator: Željko Vaško</i>
09:30 – 10:00 PL_01	Srđan Krčo, Senka Gajinov FOOD AND DIGITAL: BITS & BITES
10:00 – 10:30 PL_02	Andrei Jean Vasile CONTEMPORARY AGRICULTURE AND THE REAL GREEN REVOLUTION - DOES THE RENEWABLE ENERGY PRODUCTION REALLY MATTER?
10:30 – 10:45	<b>Discussion</b>


		<b>SECTION 1:</b>	<i>Session 1</i>
		<b>CROP SCIENCE</b>	

	<b>Oral Presentations</b>	Google Meet platform
	<i>Moderator: Novo Pržulj</i>	
<b>11:00-11:15</b> <b>O1_01</b>	Natalija Kravić, Vojka Babić, Danijela Ristić, Milan Stevanović, Anika Kovinčić, Violeta Anđelković <b>MAIZE GENETIC RESOURCES IN SERBIA – MANAGEMENT AND UTILIZATION IN BREEDING</b>	

<b>11:15-11:30</b> <b>O1_02</b>	Danijela Pavlovic, Ana Andjelkovic, Aleksandra Savic, Dragana Bozic, Sava Vrbnicanin COMMON WILD OAT ( <i>Avena fatua</i> L.) SPIKELET AND SEED MORPHOLOGY VARIATION IN BOSNIA AND HERZEGOVINA
<b>11:30-11:45</b> <b>O1_03</b>	Marko Mladenović, Nikola Grčić, Milan Stevanović, Olivera Đorđević Melnik, Milica Nikolić, Stefan Kolašinac, Slaven Prodanović EVALUATION OF GRAIN YIELD AND ITS COMPONENTS OF SOME EXPERIMENTAL, REGISTERED AND COMMERCIAL ZP MAIZE ( <i>Zea mays</i> L.) HYBRIDS
<b>11:45-12:00</b> <b>O1_04</b>	Novo Pržulj, Vojislava Momčilović, Milan Mirosavljević, Zoran Jovović, Ana Velimirović VARIATION IN DURATION OF PRE-ANTHESIS PHASES OF DEVELOPMENT IN BARLEY ( <i>Hordeum vulgare</i> L.)
P1_01	Jelena M. Golijan CONTENT OF FREE POLYPHENOLS AND FLAVONOIDS IN ORGANIC AND CONVENTIONALLY PRODUCED MAIZE SEED ( <i>Zea mays</i> )
P1_02	Vladeta Stevović, Miloš Marjanović, Dragan Đurović, Dalibor Tomić, Milomirka Madić, Vesna Đurović EFFECT OF GIBBERELIC ACID TREATMENT ON THE INITIAL INCREASE IN RED FESCUE
P1_03	Dalibor Tomić EFFECT OF GIBBERELIC ACID TREATMENT ON THE INITIAL GROWTH AND NODULATION OF WHITE CLOVER
P1_04	Snežana Mladenović Drinić, Jelena Srđić, Jelena Vukadinovic VARIABILITY OF MICRONUTRIENT CONTENT IN SWEET CORN HYBRIDS AFTER BOILING
P1_05	Zoran Maličević, Zeljko Lakic, Milan Jugović, Dragoljub Mitrovic THE SIGNIFICANCE OF TRANSVERSAL DISTRIBUTION DURING THE APPLICATION OF PLANT PROTECTION BY BOOM SPRAYER
P1_06	Ivica Djalovic, Muhammad Farooq GENOTYPE AND FERTILIZATION EFFECT ON ZINC CONTENT IN MAIZE ( <i>Zea mays</i> L.)
P1_07	Mira Vojvodić, Brankica Tanović, Petar Mitrović, Ivana Vico, Dejan Lazić, Miloš Stevanović, Aleksandra Bulajić IDENTIFICATON OF BINUCLEATE RHIZOCTONIA SPP. AG-A FROM STRAWBERRY AND MULTINUCLEATE R. SOLANI AG-2-2 FROM SUGAR BEET IN SERBIA

P1_08	Markola Saulic, Ivica Đalović, Vladan Jovanović, Dragana Božić, Sava Vrbničanin A COMPARISON OF METHODS FOR ASSESSMENT OF SOIL WEED SEED-BANK IN THE LONG-TERM CROP ROTATION
P1_09	Biljana Kelečević, Siniša Mitrić, Zlatan Kovačević SEED GERMINATION OF COMMON COCKLEBUR ( <i>Xanthium orientale</i> subsp. <i>italicum</i> (MORETTI) GREUTER)
P1_10	Iva Savić, Milica Nikolić, Vesna Kandić, Dejan Dodig, Ana Obradović, Danijela Ristić, Slavica Stanković DETERMINATION OF THE FUMONISINS CONTENT IN DIFFERENT SMALL GRAINS
P1_11	Milica Nikolić, Iva Savić, Vesna Kandić, Ana Obradović, Milan Stevanović, Danijela Ristić, Slavica Stanković RESISTANCE OF SMALL GRAINS TO TOXIGENIC FUNGI OF THE FUSARIUM GENUS OF THE LISEOLA SECTION
P1_12	Ružica Ždero Pavlović, Bojana Blagojević, Tatjana Jurić, Boris Popović EFFECT OF THE CHOLINE ON THE PRODUCTION OF PHARMACOLOGICALLY ATTRACTIVE SECONDARY METABOLITES IN WHEAT SPROUTS
P1_13	Milomirka Madić, Milan Biberdžić, Aleksandar Paunović, Desimir Knežević, Vladeta Stevović, Dalibor Tomić, Dragan Đurović GRAIN YIELD AND 1,000-GRAIN WEIGHT OF TRITICALE VARIETIES DEPENDING ON THE FERTILIZATION
P1_14	Jovana Knjeginjić, Sandra Bijelić, Dijana Kulačanin, Zoran Đogić, Borivoje Bogdanović YIELD POTENTIAL AND FRUIT QUALITY OF CLUB APPLE CULTIVARS IN CLIMATIC CONDITIONS OF EASTERN SERBIA
P1_15	Vesna Kandić, Dejan Dodig, Milan Stevanović, Nikola Grčić ZP ADMIRAL- FACULTATIVE TRITICALE VARIETY
P1_16	Danijela Ristić, Marija Kostadinović, Natalija Kravić, Anika Kovinčić, Milan Stevanović, Iva Savić, Milica Nikolić GENETIC DIVERSITY OF MAIZE INBRED LINES ASSESSED BY SSR MARKERS
P1_17	Aleksa Lipovac, Marija Čosić, Boško Gajić, Nevenka Djurović, Ružica Stričević POTENTIAL OF KLADOVO AGRICULTURAL SOIL FOR IRRIGATION FROM THE ASPECT OF INFILTRATION CHARACTERISTICS

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P1_20	Milan Biberdzic, Dragana Lalevic, Sasa Barac, Aleksandar Djikic, Vera Rajicic, Jelena Stojiljkovic THE YIELD OF SOME WHEAT VARIETIES SOWN AT THE OPTIMUM TIME AND IN LATE SOWING
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P1_22	Jovanović-Radovanov K., Simić A., Radivojević M., Mandić V., Bijelić Z., Sokolović D., Babić S. RESPONSE OF ITALIAN RYEGRASS SEED CROP TO NITROGEN FERTILIZATION AND TRINEXAPAC-ETHYL APPLICATION
12:00-12:30	<b>Discussion of oral and poster presentations</b>

 <b>AGRORES</b> 2020	<b>SECTION 2: HORTICULTURE</b>	<i>Session 1</i>
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	<b>Oral Presentations</b>	Google Meet platform
	<i>Moderator: Borut Bosančić</i>	
<b>13:00-13:15 O2_01</b>	Maja Natić, Milica Fotirić Akšić, Dragana Dabić Zagorac FRUITS UNDER THE SPOTLIGHT OF ANALYTICAL CHEMISTS	
<b>13:15-13:30 O2_02</b>	Jovana Žunić, Biljana Kelečević, Zlatan Kovačević, Dijana Mihajlović UPTAKE AND TRANSLOCATION OF HEAVY METALS BY RAGWEED ( <i>Ambrosia artemisiifolia</i> L.)	
<b>13:30-13:45 O2_03</b>	Dejana Stanić, Milica Perućica THE PRESENCE OF LEAFMINERS ON DIFFERENT APPLE VARIETIES IN THE LOCATION KULA (EAST SARAJEVO)	

<b>13:45-14:00</b> <b>O2_04</b>	Zorana Đekanović, Mihajlo Voruna, Mariana Radulović, Duška Delić ISOLATION AND IDENTIFICATION OF <i>Fusarium oxysporum</i> f.sp. <i>solani</i> (MART.) SACC. FROM SOIL ON MODIFIED NASH AND SNYDER'S MEDIUM
<b>14:00-14:15</b> <b>O2_05</b>	Vida Todorović, Branka Lazić, Nikolina Đekić POSSIBILITY OF IMPROVING VEGETABLE PRODUCTION IN REPUBLIC OF SRPSKA
<b>14:15-14:30</b> <b>O2_06</b>	Ranka Milašin, Nicoletta Contaldo, Mariana Radulović, Duška Delić MULTILOCUS TYPING OF PHYTOPLASMAS ISOLATES FROM 16SRI AND 16SRV GROUPS FROM FOREST SPECIES
<b>14:30-14:45</b> <b>O2_07</b>	Dragoslav Ivanišević, Mladen Kalajdžić, Nada Korać CHARACTERISTICS OF SOME WHITE AND RED GRAPEVINE CULTIVARS IN FRUŠKA GORA WINE REGION
<b>14:45-15:00</b> <b>O2_08</b>	Miljan Cvetkovic VITALISING ICT RELEVANCE IN AGRICULTURAL LEARNING
P2_01	Emina Mladenović, Lazar Pavlović, Milena Lakićević, Ksenija Hiel, Dragana Spasojević BIOECOLOGICAL ANALYSIS OF CITY BLOCK GREENERY IN NOVI SAD (SERBIA)
P2_02	Đorđe Malenčić, Jovana Šućur, Dejan Prvulović, Mirjana Ljubojević, Radenka Kolarov, Biljana Lazović, Mirjana Adakalić PHYTOCHEMICAL ANALYSIS AND ANTIOXIDANT POTENTIAL OF POMEGRANATE ( <i>Punica granatum</i> ) JUICE
P2_03	Lovro Sinkovič, Vladimir Meglič, Barbar Pipan DIVERSITY OF SLOVENIAN <i>Vitis</i> spp. GENOTYPES
P2_04	Lovro Sinkovič, Barbara Pipan, Vladimir Meglič, Georgios Merkouropoulos, Theodora Pitsoli, Demetrios Taskos, Younes Hmimsa, Salama El Fatehi, Mohammed Ater, Aicha El Oualkadi, Aliko Kapazoglou MEDVITIS - PROTECTING THE DIVERSITY OF MEDITERRANEAN VITIS IN A CHANGING ENVIRONMENT


P2_05	Lovro Sinkovič, Barbara Pipan, Vladimir Meglič, Sofia Petrova, Marina Antić, Penelope Bebeli, Miguel Ângelo Pinheiro de Carvalho, Aleksandra Savić, Mirjana Vasić, Creola Brezeanu <i>Lathyrus</i> DIVERSITY: AVAILABLE RESOURCES WITH RELEVANCE TO CROP IMPROVEMENT – PROGRESS REVIEWS AND RELATIONSHIP WITH AEGIS (EUGRAINLEG)
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P2_31	Tanja Krmpot, Mirela Kajkut Zeljković, Ljubomir Radoš, Đurađ Hajder MORPHOLOGICAL CHARACTERISTICS OF THE LEAVES OF AUTOCHTHONOUS GENOTYPES OF SWEET CHERRY ( <i>Prunus avium</i> L.)
P2_32	Boban Djordjević, Dejan Djurović, Gordan Zec, Vladimir Skoko INFLUENCE OF ROOT PRUNING ON VIGOUR AND FRUIT QUALITY OF APPLE CULTIVAR GOLDEN DELICIOUS CLON RAINERS



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P2_36	Antonije Žunić, Slavica Vuković, Sanja Lazić, Dragana Šunjka, Dragana Bošković, Aleksandra Alavanja SUSCEPTIBILITY OF <i>GRAPHOLITA MOLESTA</i> BUSCK TO INSECTICIDES IN PEACH ORCHARDS
P2_37	Sanja Lazić, Dragana Šunjka, Marijana Skenderović, Antonije Žunić, Slavica Vuković, Aleksandra Alavanja DISSIPATION DYNAMIC OF INDOXACARB INSECTICIDE IN PEACH FRUITS
P2_38	Alma Mičijević, Aida Šukalić, Svetlana Hadžić, Alma Leto ANALYSIS OF VITAMIN C CONTENT OF POMEGRANATE FRUITS IN DIFFERENT LOCALITIES OF HERZEGOVINA
15:00-15:30	<b>Discussion of oral and poster presentations</b>

 <b>AGROReS</b> 2020	<b>SECTION 3:</b> <b>ANIMAL SCIENCES</b>	<i>Session 2</i>
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	<b>Oral Presentations</b>	Google Meet platform
	<i>Moderator: Nebojša Savić</i>	
<b>11:00-11:15</b> <b>O3_01</b>	Vesna Gantner, Mirna Gavran, Maja Gregić, Božo Važić, Ranko Gantner, Klemen Potočnik THE VARIATION IN MILK COMPOSITION OF DAIRY GOATS DUE TO N-3 UNSATURATED FATTY ACIDS SUPPLEMENTATION	

<b>11:15-11:30</b> <b>O3_02</b>	Bozo Vazic, Biljana Rogic, Milanka Drinic, Vesna Gantner , Slobodan Momic, Ivan Pihler FLEECE MASS AND PHYSICAL-MECHANICAL PROPERTIES OF WOOL OF DUPSKA SHEEP
<b>11:30-11:45</b> <b>O3_03</b>	Dragan Dokić, Mirna Gavran, Maja Gregić, Vesna Gantner THE IMPACT OF TRADE BALANCE OF AGRI-FOOD PRODUCTS ON THE STATE’S ABILITY TO WITHSTAND THE CRISIS
<b>11:45-12:00</b> <b>O3_04</b>	Predrag Ilić, Manja Vitasović, Aleksandar Mladenović IMPACT OF THE TRAINING PROCESS ON THE LEVEL OF STRESS IN HORSES
<b>12:00-12:15</b> <b>O3_05</b>	Bojana Rudić, Biljana Rogić, Aljoša Janjić, Božo Važić THE GENERATION INTERVALS IN LIPIZZAN HORSE FROM STATE-OWNED STUD VUČIJAK
<b>12:15-12:30</b> <b>O3_06</b>	Mirna Gavran, Vesna Gantner TRENDS IN POPULATIONS OF THE MOST COMMON LARGE GAME IN A HUNTING AREA IN EASTERN CROATIA IN INTERVAL 2008–2018
P3_01	Đorđe Savić, Željko Sladojević, Danijela Kirovski, Stoja Jotanović, Srđan Čolović INCIDENCE OF REPRODUCTIVE PATHOGENS IN BREEDING PIGS POPULATION ON SELECTED FARMS IN REPUBLIC OF SRPSKA
P3_02	Dojčinović Slobodan, Saša Lovrić, Golić Bojan, DETERMINATION OF THE PRESENCE OF AFLATOXIN B1 IN FEED IN REPUBLIC OF SRPSKA (BIH) IN THE PERIOD OF 2017-2019.
P3_03	Bojan Golić, Vesna Kalaba, Slobodan Dojčinović MICROBIOLOGICAL CRITERIA IN THE PRODUCTION OF STERILISED MILK
P3_04	Slađana Preradović, Biljana Rogić, Aljoša Janjić, Božo Važić STUDBOOK FROM STATE-OWNED STUD VUČIJAK: ERRORS AND CORRECTIONS
P3_05	Nebojša Savić, Dragan Mikavica YOLK SAC CONVERSION EFFICIENCY OF BROWN TROUT ( <i>Salmo trutta</i> M. Fario) AND RAINBOW TROUT ( <i>Oncorhynchus mykiss</i> ) DURING ENDOGENOUS NUTRITION
P3_06	Stoja Jotanović, Ratko Mijatović, Vladimir Salak, Mladinko Lulić, Goran Kostić, Đorđe Savić, Milutin Cvijanović, Marinko Vekić EMBRYOTRANSFER IN CATTLE
P3_07	Vesna Kalaba, Bojan Golić, Tanja Ilić ANTIBACTERIAL ACTIVITY OF DIFFERENT TYPES OF HONEY ON PATHOGENIC BACTERIA

P3_08	Marinko Vekić, Živko Klincov, Stoja Jotanović, Đorđe Savić PRODUCTION RESULTS OF BROILER CHICKEN FARMS OF DIFFERENT CAPACITIES IN REGION OF BANJA LUKA
12:30-13:00	<b>Discussion of oral and poster presentations</b>

	<b>SECTION 4: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT</b>	<i>Session 2</i>
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	<b>Oral Presentations</b>	Google Meet platform
	<i>Moderator: Dragan Brković</i>	
<b>13:00-13:15 O4_01</b>	Aleksandar Ostojić, Željko Vaško, Dragan Brković ASSESSMENT OF WHEAT SELF-SUFFICIENCY IN BOSNIA AND HERZEGOVINA	
<b>13:15-13:30 O4_02</b>	Gordana Rokvic, Dragan Brkovic AGRICULTURAL AND RURAL COOPERATIVES DEVELOPMENT – THE LATEST TRENDS	
<b>13:30-13:45 O4_03</b>	Gordana Rokvic, Ljiljana Drinic, Nebojsa Novkovic IMPLEMENTATION OF GENDER RESPONSIVE BUDGETING IN AGRICULTURE AND RURAL DEVELOPMENT IN BOSNIA AND HERZEGOVINA AND THE SURROUNDING COUNTRIES	
<b>13:45-14:00 O4_04</b>	Nebojša Novković, Beba Mutavdžić, Žarko Ilin, Nataša Vukelić, Šumadinka Mihjlović ANALYSIS AND PREDICTION OF PRODUCTIVE AND ECONOMIC CHARACTERISTICS OF WATERMELON PRODUCTION IN VOJVODINA REGION	
<b>14:00-14:15 O4_05</b>	Ranko Sarić, Snežana Branković, Adiba Džudović THE EFFECT OF WEED CONTROL IN POPLAR PLANTATIONS	
<b>14:15-14:30 O4_06</b>	Aleksandar Miljatović, Veljko Vukoje ANALYSIS OF NET WORKING CAPITAL OF AGRICULTURAL ENTERPRISES OF VOJVODINA	
<b>14:30-14:45 O4_07</b>	Bratislav Pešić, Nikola Stolić, Nebojša Zlatković TYPE OF WASTE AS A FACTOR OF ECONOMIC DEVELOPMENT OF HOUSEHOLDS AND ENVIRONMENTAL PROTECTION IN RURAL ENVIRONMENTS	

<b>14:45-15:00</b> <b>O4_08</b>	Marija Stojadinović, Bratislav Pešić, Nikola Stolić, Nebojša Zlatković THE SIGNIFICANCE OF AGRICULTURAL ADVISORS FOR AGRICULTURAL DEVELOPMENT IN THE TOPLICA DISTRICT
<b>15:00-15:15</b> <b>O4_09</b>	Vesna Mrdalj, Leila Šeper, Nataša Tomić AGRICULTURAL SUPPORT POLICIES OF BOSNIA AND HERZEGOVINA AND INTERNATIONAL ECONOMIC INTEGRATIONS
<b>15:15-15:30</b> <b>O4_10</b>	Željko Vaško, Veselin Dutina, Boris Vaško INTERMEDIATION IN INCREASE OF AGRICULTURAL LAND USE BY ICT SUPPORT
<b>15:30-15:45</b> <b>O4_11</b>	Tihomir Novaković, Beba Mutavdžić, Dragan Milić, Dragan Tekić, Aleksandar Miljatić MEASURING OF TECHNICAL EFFICIENCY OF AGRUCULTURAL HOLDINGS IN SERBIA USING DEA METHOD
<b>15:45-16:00</b> <b>O4_12</b>	Sanjin Ivanović, Zorica Vasiljević, Jonel Subić TREATMENT OF OTHER GAINFUL ACTIVITIES AND MARKETING COSTS ACCORDING TO VARIOUS FADN REGULATIONS
P4_01	Bojan Dimitrijević, Jelena Golijan, Slavoljub Lekić, Nada Lakić THE IMPACT OF SOME SOCIO - DEMOGRAPHIC FACTORS ON CONSUMER ATTITUDES TOWARD ORGANIC SEED IN THE REPUBLIC OF SERBIA
P4_02	Vera Rašković, Nemanja Stošić, Milan Glišić ANALYSIS OF PRODUCTION, EXPORT AND IMPORT OF TOMATOES IN SERBIA
P4_03	Ljiljana Drinić ENTREPRENEURSHIP DEVELOPMENT BY LEAN STARTUP METHODOLOGY
P4_04	Enika Gregorić, Vesna Počuča, Gordana Matović, Mirjana Ruml DROUGHT ANALYSIS FOR THE REGION OF NORTH BACKA, SERBIA
P4_05	Nemanja Jalić, Aleksandar Ostojić BOSNIA AND HERZEGOVINA'S WINE FOREIGN TRADE AND MARKET
P4_06	Mihajlo Munćan, Tamara Paunović, Jelena Đoković IMPROVING THE ECONOMIC EFFICIENCY OF FAMILY FARMS BY INTRODUCING A NEW LINE OF LIVESTOCK PRODUCTION
P4_07	Stanislav Zekić, Bojan Matkovski, Danilo Đokić WINE PRODUCTION IN SERBIA AND COMPETITIVENESS ON INTERNATIONAL MARKET

P4_08	Marija Stojadinović, Pešić Bratislav, Nikola Stolić, Nebojša Zlatković THE SIGNIFICANCE OF AGRICULTURAL CONSULTANTS FOR THE DEVELOPMENT OF AGRICULTURE IN THE TOPLICA DISTRICT
16:00-16:30	<b>Discussion of oral and poster presentations</b>

01\_04

## **Variation in duration of pre-anthesis phases of development in barley (*Hordeum vulgare* L.)**

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### **Abstract**

Phenology of small cereals as a complex trait, which provides matching plant development with growing conditions, is important factor that influence plant adaptation to particular environment and finally yield. Scales of growth based on plant phenology and scales of development based on apical morphology are very precise, but relationships between them are not always clear. Some morphogenetic features of cereals growth can be predicted on the basis of leaf appearance. That means shoot apex development is coordinated with leaf appearance and total number of formed leaves. The objective of this research was to study relationships among apical development and plant phenology and the variability in phenological development of diverse winter barley cultivars under field conditions. The twelve barley cultivars differed in origin, pedigree and agronomic traits were used in this study over six growing seasons at the Novi Sad location (45°20'N, 15°51'E, altitude 86 m) and under rainfed conditions. Phyllochron approach was used as method to determination of beginning/finishing stages of development apex and the duration of the phases was converted to cumulated growing degree days (GDD). Spikelet initiation started at 2.5 Haun stage and finished at 7.1 Haun stage. Preanthesis phases (single ridge-SR, double ridge-DR, spikelet development-SD, heading-H, anthesis-A) and grain filling period (GFP) were under significant effect of genetic (G), environmental (E) and interaction factors (GxE). Of the total variation of DR phase 55.7% participated to GxY, 22.1% to E and 12.3% to G. Spikelet development were mainly under G and E control, 42% and 44%, respectively. Heritability was 0.57 and 0.95 for DR and SD, respectively. Across cultivars and environments from the total growing period 138 GDD belonged to sowing-first leaf period, 161 to SR, 326 to DR, 541 to SD, 254 to flag leaf-H, 142 to H-A and 732 to GF. Although the variability was found in the duration of the pre-anthesis phases and GF, especially in spikelet and flower development, among most of the phases a positive genotypic correlation was found.

*Key words:* Barley (*Hordeum vulgare* L.), spike development