

PROMOTING SMART AGRICULTURAL PRACTICES IN MAIZE PRODUCTION IN BIH - H2020 SMARTWATER PROJECT

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Abstract: Agricultural practices in Bosnia and Herzegovina demand different improvements, including smart management of land and water resources. A new H2020 project started in 2021 in this regard. The objective of this publication is to spread knowledge about SMARTWATER project by describing different achievements in two years of implementation (2021-2022), to invite target groups to participate in the action and to promote smart agricultural practices. Presented results indicate that the implementation is at a satisfactory level. Project consortium will continue with efforts, including twinning, networking, research, dissemination and increasing competency and fund rising skills.

Keywords: twinning, research, exchange, irrigation, smart technologies

Introduction and literature review

Smart management of land and water resources in Bosnia and Herzegovina (BiH), as a country with a good irrigation potential but rainfed agriculture practices, is very important (World Bank, 2012; FAO, 2017). In line with these a new H2020 project SMARTWATER² started with its implementation on the 1st of January 2021. The main research themes are in line with the needs of BiH agriculture and relevant research, and include: 1) cloud-based smart technologies (Romero et al., 2012; Todorovic et al., 2016), 2) new generation of satellite remote sensing data (Paço et al., 2014; Mateos et al., 2013), 3) water-energy-food nexus (Zapata et al., 2017) and 4) climate change impact to agriculture (Stričević et al., 2014; Todorovic et al., 2018). The effect of irrigation

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²<http://www.smartwater-project.eu/>

and fertilization treatments was studied in maize (Živanović et al., 2015; Kresović et al., 2016; Stričević et al., 2017; Dodig et al., 2021).

The main objective of SMARTWATER is to reinforce new networking, research and S&T cooperation capacities of the University of Banja Luka (UNI-BL), the University of Sarajevo (UNSA) and other connected national institutions, in the field of sustainable agricultural water management and to increase their competency and fund raising skills for a successful participation in the European Union Research Programs.³The project duration is 36 months. SMARTWATER consortium consists of six partners⁴: UNI-BL, CIHEAM-IAMB, CSIC, ISA, SYS and UNSA and implementation is planned through five Work Packages (WPs).

The objective of this paper is to spread knowledge about SMARTWATER project by describing achievements in two years of implementation (2021-2022), to invite all project target groups to participate in the action and to promote smart and sustainable practices in agriculture in Bosnia and Hercegovina.

Opening new horizons: the project implementation started in 2021

period January-June 2021

The H2020 SMARTWATER project started with its implementation on the 1st of January 2021. The first activity was kick-off meeting, held in a hybrid form (27.1.). The event gathered 36 participants and great outcomes were achieved.

The dissemination was done in order to spread knowledge about project and to gather and involve target groups. We established SMARTWATER project logo and official website, as well as social media profiles on *Facebook*, *Twitter*, *LinkedIn* and *YouTube*, published posts and news. The joint experimental studies (WP3) were prepared. We published the info for master course in Bari (Italy) at CIHEAM-IAMB (WP2).

The UNI-BL team participated in the REA Cluster Event⁵(20.5.) and in symposium AgroReS 2021⁶ (27-28.5.). The 1st stakeholders' meeting was

³European Commission (2020). Grant Agreement, project number 952396, SMARTWATER.

⁴UNI-BL (UNIVERZITET U BANJOJ LUCI), CIHEAM-IAMB (CENTRO INTERNAZIONALE DI ALTISTUDI AGRONOMICI MEDITERRANEI), CSIC (AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS), ISA (INSTITUTO SUPERIOR DE AGRONOMIA), SYS (SYSMAN PROGETTI & SERVIZI SRL), UNSA (UNIVERZITET U SARAJEVU).

⁵<https://faster-h2020.eu/wp-content/uploads/2021/05/Final-report-Cluster-meeting-Agri-Nat-Res.pdf>

⁶<https://agrores.net/en/>

organized by UNSA (7.6.) and more than 30 participants joined. We also prepared and submitted to the European Commission (EC) project reports (deliverables) in WP1 and WP5.

period July-December 2021

The main project activity in this period was the 1st summer school. It was organized by UNI-BL in BiH in Trebinje (30.8. – 3.9.) and 40 participants joined. The topic was *"Integrated approach for agricultural water management"*.

Project financial and administrative issues were discussed. We worked on the equipment procurement. Also, cultivations and plant and soil samplings in maize were done. SMARTWATER project was presented in an interview to INTRASOFT International⁷. We participated in the ERA *Info Day*⁸ event(9.7.). We joined two conferences, *"Soils for future under global challenges"* organized in Serbia (21-24.9.) and *"Agrosym 2021"* organized in BiH (7-10.10.)⁹.

As one of the main activities, ISA organized the first advanced training course in Portugal in Lisbon(27.9. – 1.10)and 32 people joined. The topic was *"Advanced remote sensing technologies and tools for crop water requirements estimates and irrigation scheduling"*.

Master students started their course (1.10.). CATCHaCORN¹⁰ students' competition was organized (24.10.). Dissemination activities were pronounced and SMARTWATER was further promoted. The 1st year of experiments was finished. The remaining project reports in 2021 were sent to EC.

Staying in lane: the project implementation continued in 2022

period January - June 2022

The second project year has started with a lot of experience behind us. We begin to prepare data for the 1st periodic report and to implement forthcoming activities. Dissemination activities continued. The 2nd year of experiments was prepared. We joined the *"World Water Day"*¹¹ in Patras in Greece (22.5.) and the“

⁷<https://www.netcompany-intrasoft.com/>

⁸https://research-and-innovation.ec.europa.eu/events/horizon-europe-info-days/era-and-widening/july-2021_en

⁹<https://congress.sdpz.rs/> and <http://agrosym.ues.rs.ba/>

¹⁰<http://www.smartwater-project.eu/the-first-competition-in-maize-harvesting-catchacorn-event/>

¹¹<http://www.smartwater-project.eu/world-water-day-22-march-2022-patras-greece/>

5th International Scientific Conference on Water¹² in Szarvas in Hungary (22-24.3.).

We continued to cooperate with similar H2020 projects. We presented the project at “AgroReS 2022¹³” (26-28.5., Trebinje, BiH). ISA team joined the “ENCONTRO CIÊNCIA¹⁴” in Lisbon (Portugal) from 16th to 18th of May 2022.

UNSA team organized the second stakeholders’ meeting (20.6.). The topic was “Promotion of sustainable agricultural water managements practices in Bosnia and Herzegovina” and 83 participants joined. ISA participated in the “National Fair of Agriculture” in Portugal (4-12.6.). Two students from BiH were awarded master’s degree at CIHEAM-IAMB. We submitted reports in WP 1, WP 4 and WP 5.

period July- December 2022

The main project activity in this period was the second summer school. It was organized by UNSA in Sarajevo in BiH (18-22.7) with 46 participants. The topic was “Smart technologies and best practices (technical and practical) for sustainable and environmentally efficient water management in agriculture”. SMARTWATER was presented at the “International Symposium on Managing Land and Water for Climate-Smart Agriculture¹⁵” held in Vienna in Austria (25-29.7.). Project reports in WP 2 and WP 5 were submitted. UNSA team organized the first workshop on funding opportunities and proposal drafting in Sarajevo in BiH (11-13.10.). We presented SMARTWATER at three conferences, the first one was held in Velke Bilovice¹⁶ in Czech Republic (6-7.10.), the second one in Ohrid¹⁷ in North Macedonia (12-14.10.) and the third one in Beja¹⁸ in Portugal (18-20.10.).

As one of the main activities, CSIC organized the second advanced training course in Zaragoza in Spain (26-30.9.) and more than 20 people joined. The topic was “Use of innovative technologies and tools for collective and on-demand pressurized irrigation systems”.

¹²<http://www.smartwater-project.eu/5th-international-scientific-conference-on-water/>

¹³<https://agrores.net/en/>

¹⁴<https://www.encontrociencia.pt/2022/>

¹⁵<http://www.smartwater-project.eu/smartwater-project-at-the-international-symposium-on-managing-land-and-water-for-climate-smart-agriculture/>

¹⁶<http://www.smartwater-project.eu/smartwater-project-at-the-international-conference-on-urban-water-2022/>

¹⁷ <https://isaf2022.isaf.edu.mk/>

¹⁸<http://www.smartwater-project.eu/smartwater-project-at-ix-national-congress-on-irrigation-and-drainage-in-beja-portugal/>

The second PSG_SEAB meeting was held by UNI-BL in Banja Luka and Teslić (BiH), from 13th to 16th of December 2022. This was great opportunity to gather all PSG and SEAB members, to have the overview of activities and achievements in two years of project implementation and to plan future activities.

At the end of 2022 we summarized our efforts, sent all the necessary project reports and established the framework for the activities in 2023. The effort of SMARTWATER project consortium in 2021 and 2022, when it comes to the pre-defined activities, is presented in Table 1.

Table 1. The overview of activities within SMARTWATER project in 2021 and 2022

| <i>no.</i> | <i>Activity type</i> | <i>Accomplished</i> | <i>Project report reference</i> |
|------------|-------------------------------|----------------------------|---------------------------------|
| 1 | advanced training courses | 2/3 | D2.4 / D5.9 |
| 2 | summer schools | 2/3 | D2.3 / D5.8 |
| 3 | joint research activities | 2/3 | D3.1 / D3.2 / D3.3 |
| 4 | meetings – roundtable debates | 2/3 | D4.3 |
| 5 | post-graduate MSc programs | 3/3 (1 st year) | D2.8 / D2.9 / D2.10 |
| 6 | mutual staff exchanges | 3/13 | D3.1 / D3.2 / D3.3 |
| 7 | hands-on workshops | 1/3 | D2.5 |
| 8 | international conferences | 13/3 | - |
| 9 | smart water management tools | 2/2 | - |

Slowing down: future plans and activities in 2023

In 2023, SMARTWATER project life will hopefully continue. The activities to be organized include remaining advanced courses, summer schools and exchanges, the last year of MSc and experimental studies, and the last year of stakeholders' meetings, hands-on workshops and participation to conferences.

Joint experimental studies – basic considerations

Within WP 3, the joint research includes experiments in 3 years and at two locations in BiH (Aleksandrovac and Butmir). The target plant species is maize (*Zea mays* L.), hybrid BL 43 (FAO 400 group). The RCB design include two factors, irrigation (3 irrigation levels) and fertilization (2 nitrogen levels). The aim of these experiments is to find the best combination of irrigation and fertilization treatments in maize production in agro-ecological conditions of Banja Luka and Sarajevo (BiH) and to promote smart agricultural practices in land and water management in agriculture in BiH.

Conclusion

In two years of SMARTWATER project implementation a lot of twinning activities were performed. We organized summer schools and advanced courses, participated in more than 15 conferences in BiH and abroad, joined 6 EC workshops, and had 2 stakeholders' meetings. Along with these, we have worked on project reports, dissemination, staff exchange and publications within the main research themes. Our mutual efforts contributed the increase of networking and research between UNI-BL, UNSA and connected institutions and the increase of our competency and fund rising skills for new proposals toward the EC, which are the main project objectives. The presence of a lot of activities in 2023 should not stop project consortium in putting more effort to achieve goals and to work on project legacy.

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