UNIVERSITÀ DEGLI STUDI DI MILANO

SELEZIONE PUBBLICA, PER TITOLI ED ESAMI, PER IL RECLUTAMENTO DI N. 1 UNITÀ DI TECNOLOGO DI SECONDO LIVELLO CON RAPPORTO DI LAVORO SUBORDINATO A TEMPO DETERMINATO DELLA DURATA DI 24. MESI, PRESSO L'UNIVERSITÀ DEGLI STUDI DI MILANO - DIPARTIMENTO DI SCIENZE AGRARIE E AMBIENTALI - PRODUZIONE, TERRITORIO, AGROENERGIA, PER L'ATTUAZIONE DEL PROGRAMMA DI RICERCA "NATIONAL RESEARCH CENTRE FOR AGRICULTURAL TECHNOLOGIES", TEMATICA "TECNOLOGIE DELL'AGRICOLTURA - AGRITECH" (CUP G43C22001330005) NELL'AMBITO DEL PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) - CODICE 22231.

La Commissione giudicatrice della selezione, nominata con Determina Direttoriale n. 159 del 10.01.2023, composta da:

Prof. Daniele Pedretti	Presidente
Prof.ssa Giovanna Sona	Componente
Dott.ssa Letizia Maria Agostina Bonizzoni	Componente
Dott. Piero Parenti	Segretario

comunica i quesiti relativi alla prova orale:

Quesito 1
Si chiede di illustrare le fasi principali della progettazione e realizzazione di un geodatabase che sia efficientemente in grado di contenere informazioni provenienti da sistemi di monitoraggio multi-sensore per la misura in continuo di variabili agro-idrologiche in pieno campo, nonché di campagne periodiche di misura con strumentazioni portatili. Nello specifico, il sistema di monitoraggio deve riferirsi ad una piattaforma composta da appezzamenti in cui l'irrigazione viene applicata attraverso diverse tecniche sia in pressione (goccia superficiale e interrata, aspersione), che a gravità.

Testo in inglese

The current study aims to evaluate the capabilities of soil water balance modeling to estimate ET for very different conditions of rainfed grapevine water status, within a vineyard landscape that depicts heterogeneities in canopy, soil and water table conditions. We calibrated the HYDRUS-1D model against measurements of the soil moisture profile within seven contrasted sites, we validated HYDRUS-1D simulations against ET estimates derived from eddy covariance (EC) measurements within two contrasted sites, and we analyzed the temporal dynamics of the HYDRUS-1D ET simulations throughout almost two growth cycles for the seven sites. The calibration of HYDRUS-1D was correctly achieved, with a relative RMSE of 20% on average. Validation of HYDRUS-1D simulations against EC measurements was satisfactory, with RMSE values of about 40 W m−2 at the hourly timescale and 0.5 mm d−1 at the daily timescale. HYDRUS-1D was able to provide consistent time series of ET within the seven contrasted sites and throughout the two growth cycles. We conclude that HYDRUS-1D simulations can be used as an alternative to EC measurements within rainfed vineyards, to alleviate experimental efforts for device cost and maintenance. Further, HYDRUS-1D simulations can be used for characterizing spatial variabilities and temporal dynamics, assessing impact of pedological conditions and land use on ET, or validating remote sensing retrievals over regional extents.

Quesito 2
Si chiede di illustrare uno o più modelli idrologici per la simulazione del bilancio idrologico nei sistemi suolo-vegetazione-atmosfera, con particolare riferimento allo studio di piattaforme composte da appezzamenti in

cui l'irrigazione viene applicata attraverso diverse tecniche sia in pressione (goccia superficiale e interrata, aspersione), che a gravità.

Testo in inglese

Studies conducted at the field scale report significant reductions in the irrigation requirements of rice when continuous submergence (CS) is replaced by less water-demanding regimes such as flush-irrigation (FI, i.e. intermittent irrigations of rice growing in non-submerged soils). However, the effects of their extensive application in paddy areas with shallow groundwater is much less studied. We present a scenario analysis investigating the impacts on irrigation requirements induced by a shift from CS to FI in an irrigation district of Northern Italy where rice is the main crop, followed by maize and poplar. The area is characterised by a shallow water Table whose depth fluctuates between two meters (in winter) and less than 1 m (in summer). We applied a three-stage procedure, where we first analysed present state conditions using the SWAP (Soil, Water, Atmosphere, Plant) model to simulate irrigation deliveries and percolation fluxes. Then, we calibrated an empirical relationship between estimated percolation fluxes and measured depths to groundwater. Finally, we applied this relationship, in combination with the SWAP model, to predict the variation of district irrigation requirements due to a widespread shift from CS to FI. Results show that neglecting the feedback between groundwater recharge due to irrigation and groundwater depth led to overestimating the reduction of irrigation requirements of rice, which decreased from around 80% when no feedback was considered to around 60% when it was accounted for. Moreover, increased groundwater depths resulted in higher irrigation requirements for maize with an estimated growth of more than 50% due to the need of shortening the irrigation turn. These results demonstrate the importance of considering the impacts on the hydrological processes at larger scales when planning the conversion of CS into more efficient field irrigation methods.

Milano, 8 febbraio 2023

La Commissione

Prof. Daniele Pedretti - Presidente ……

Prof.ssa Giovanna Sona - Componente ……

Dott.ssa Letizia Maria Agostina Bonizzoni - Componente ……

Dott. Piero Parenti - Segretario ……