CONCORSO PUBBLICO, PER ESAMI, PER N. 1 UNITÀ DI PERSONALE APPARTENENTE ALL'AREA DEI FUNZIONARI, SETTORE SCIENTIFICO-TECNOLOGICO, CON CONTRATTO DI LAVORO SUBORDINATO A TEMPO INDETERMINATO E REGIME DI IMPEGNO A TEMPO PIENO, PER LE ESIGENZE DEL DIPARTIMENTO DI ECCELLENZA DI AGRARIA DELL'UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II (COD. RIF. 2416), IN ATTUAZIONE DEL PROGETTO "DIPARTIMENTI DI ECCELLENZA 2023-2027" - CUP E63C22003650006, INDETTO CON DECRETO DEL DIRETTORE GENERALE N. 1109 DEL 3.10.2024

GRUPPI 2 E 3 NON ESTRATTI PROVA ORALE DEL 22.11.2024

Quesito A

Il candidato illustri le metodologie per la pianificazione dei rilievi agroforestali con sensori multispettrali.

Quesito B

Silvestri, N., Ercolini, L., Grossi, N., Ruggeri, M. (2024). "Integrating NDVI and agronomic data to optimize the variable-rate nitrogen fertilization." *Precision Agriculture*, 25, 2554–2572. https://doi.org/10.1007/s11119-024-10185-2

Testo estratto dalla pagina 3 (1843) – paragrafo materals and methods

change. We expected increased WUE resulting from eCO_2 to counterbalance the drying effect of warming and reduced precipitation on the communities such that below-ground biomass would not be negatively affected by warmer temperatures under RCP8.5 scenario interacting with reduced precipitation. Reduced precipitation should instead have adverse effects on communities when interacting with RCP2.6. More specifically, we asked:

(i) Does climate change, grassland functional composition and their interaction affect biomass allocation to above- and below-ground compartments in mesocosm grasslands?
(ii) What is the effect of climate change, grassland functional composition and their interaction on the root traits yielded by mesocosm grasslands?
(iii) Do the below-ground responses of mesocosm grasslands to climate change vary with soil depth?

2 | MATERIALS AND METHODS

2.1 | Experimental design

In a mesocosm experiment in a controlled-environment facility ('ecotron', sensu Roy et al., 2021), we simulated the early establishment (i.e. the first 3 months after sowing) of model grasslands. The

2.3 | Ecotron experiment

We ran the experiment for 10 weeks in four walk-in chambers (Figures S1–S3) located at the TUMmesa ecotron (described in Roy et al., 2021); more information is provided as Supporting Information. After 27 days of establishment of the grasslands, we simulated environmental conditions of two climate-change scenarios (RCP2.6 and 8.5; in two chambers per scenario), reflecting environmental parameters of early summer (May–July) in an urban setting (Munich, Germany). RCP2.6 was the control, with $[CO_2]$ and temperature at current values, while RCP8.5 represented worst-case climate change, with nearly doubled $[CO_2]$ and +3°C air temperature (see Supporting Information, Figure S4 for additional information on climate change simulation). Precipitation was manually controlled in each community. The mean precipitation recorded in Munich from May to July 2000–2019 was distributed over the experimental period. Reduced precipitation represented a 50% reduction in water input, mimicking a water-scarce early-growing season. Indeed, we simulated only precipitation variations in early summer conditions (May–July) to test the effects of a particularly dry phase of the growing season, whereas mean annual precipitation values are not expected to change much for Central Europe (IPCC, 2021).

Caso situazionale C

Ti trovi a coordinare un gruppo di lavoro che negli ultimi tempi appare poco motivato e fa fatica a raggiungere gli obiettivi che gli prefissi. Scopri che alcuni di loro hanno chiesto di cambiare ufficio senza dirtelo. Come gestisci la situazione?

Quesito A

Il candidato illustri le caratteristiche dei fermentatori per il riutilizzo degli scarti agroalimentari.

Quesito B

Rojas-Botero, S., Teixeira, L. H., Prucker, P., Kloska, V., Kollmann, J., Le Stradic, S. (2023). "Root traits of grasslands rapidly respond to climate change, while community biomass mainly depends on functional composition." *Functional Ecology*, 37, 1841–1855. https://doi.org/10.1111/1365-2435.14345

Testo estratto dalla pagina 1 – paragrafo abstract

Abstract

The success of Variable Rate Application (VRA) techniques is closely linked to the algorithm used to calculate the different fertilizer rates. In this study, we proposed an algorithm based on the integration between some estimated agronomic inputs and crop radiometric data acquired by using a multispectral sensor. Generally, VRA algorithms are evaluated by comparing the yields, but they can often be affected by factors acting in the final phase of the crop cycle and not dependent on the fertilization treatments. Therefore, we decided to compare our algorithm (ALG) versus the traditional application of fertilizer (TRD) by evaluating the crop growth 1.5 months after the fertilization time. The algorithm was tested on a sorghum crop under organic farming, managed with or without manure. The saving of N obtained with ALG was equal to 14 and 5 kg ha^{-1} (-14 and −10% for the non-manure and fertilized treatments, respectively). The NDVI values acquired after fertilization showed a remarkable reduction of relative standard deviation for ALG system (from 22 to 9% and from 34 to 14% for manured and not manured, respectively), which was not found for TRD system (from 16 to 17% and from 29 to 18% for manured and not manured, respectively). The above ground biomass produced was statistically equivalent for the two systems in the manured plots and significant higher for ALG in not-manured plots (+0.74 t ha^{-1} of dm, equal to +23%). Finally, the indices calculated to evaluate the Nitrogen Use Efficiency (NUE) were consistently better in the ALG theses.

Keywords Sorghum · Nitrogen use efficiency · Precision agriculture · Remote sensing · NDVI map

Caso situazionale C

Sei un responsabile di un progetto all'interno di un'organizzazione, con il compito di coordinare un gruppo di lavoro per completare una serie di attività che hanno una scadenza imminente. Hai ricevuto una discrezionale autonomia nella gestione del progetto. A metà del percorso, ti accorgi che una delle attività principali non sta procedendo come previsto: ci sono ritardi imprevisti e alcune risorse sono carenti. Come gestisci la situazione?

PER ORDINE DEL PRESIDENTE DELLA COMMISSIONE
IL SEGRETARIO
F.TO GIANNIELLO NICOLA