The PRIMA programme is supported and funded under Horizon 2020, the European Union's Horizon 2020 research and innovation

PUBBLICAZIONE, AI SENSI DELL'ART. 19 DEL D.LGS N. 33 DEL 14 MARZO 2013, MODIFICATO DALL'ART. 18 DEL D.LGS N. 97 DEL 25 MAGGIO 2016 COME INTEGRATO DALL'ART. 1 C. 145 DELLA LEGGE 27 DICEMBRE 2019 N. 160, DEI QUESITI STABILITI DALLA COMMISSIONE ESAMINATRICE DEL CONCORSO DI SEGUITO INDICATO NELLA RIUNIONE IN DATA 30/04/2025

Bando N. 331.1 RIC IBBA Protocollo 31816 del 05-02-2025.
Selezione per titoli e colloquio ai sensi dell'art. 8 del "Disciplinare concernente le assunzioni di personale con contratto di lavoro a tempo determinato", per l'assunzione, ai sensi dell'art. 141 del CCNL del Comparto "Istruzione e Ricerca" 2019-2021, sottoscritto in data 18 gennaio 2024, di una unità di personale con profilo professionale di Ricercatore III livello, presso l'Istituto di Biologia e Biotecnologia Agraria del CNR sede di Milano. Progetto FEED PRIMA 2022 From Edible Sprouts to Healthy Food - CUP B53C23000960006.

Elenco Domande n. 1 – BUSTA NON ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) I metaboliti secondari: ruolo nella pianta.
3) Secondary metabolites: their role in the plant.

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"In relation to carbohydrates, germination increases the amylase activity that is responsible for the starch hydrolysis into simple sugars, and the duration of the germination period affects the starch degradation. Ma et al. analyzed the changes in starch structure and in vitro digestion profile of a specific maize cultivar after 0–5 days of germination. The results showed significant reduction in the total content of starch, amylose, and amylopectin, as the corn germination progressed Another important change that occurs due to grain germination is related to

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proteins, since the storage proteins are hydrolyzed in peptides and amino acids by proteolytic enzymes after 2–3 days of imbibition."

Elenco Domande n. 2 – BUSTA ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Descrivi una classe di metaboliti secondari e i loro effetti sulla salute umana.
3) Describe a class of secondary metabolites and their effects on human health

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"Sprouts are phytonutrient-rich vegetable foods, being a good source of flavonoids, other polyphenols, glucosinolates, isothiocyanates, proteins, minerals, and vitamins. For this reason, according to Reed et al., sprouts are considered "functional foods", which are those foods that contain health- promoting properties in addition to their normal nutritional value. On the other hand, the ingestion of sprouts has been related to the occurrence of several foodborne disease outbreaks around the world. The contamination of sprouts by pathogens is a major concern, since the conditions for grain germination are also ideal for bacterial proliferation. Thus, although the germination process is easy to carry out, some strategies should be addressed in order to prevent microbial growth, such as adopting physical, biological, and chemical interventions."

Elenco Domande n. 3 – BUSTA NON ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Cosa sono i germogli edibili, metodi per produrli, proprietà, problemi e soluzioni per conservazione a lungo termine.
3) What are edible sprouts, methods for their production, properties, issues and solutions for long-term preservation?

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"Sprouts represent a great source of several micronutrients, macronutrients, and secondary metabolites of plants . The biological activity of these compounds is related to their antioxidant ability, which can reduce the oxidative stress caused by the excessively high levels of reactive oxygen species in the cells, providing molecular tools to counter the imbalance between the production of reactive oxygen species and the ability to modulate the redox balance. During the germination process, after water absorption and a period of respiration, the grains activate and synthesize endogenous enzymes. Following the activity of the endogenous enzymes, extensive phytochemical changes are reported, reflecting a dynamic and complex flow of nutrients, including remobilization, degradation, and accumulation."

Elenco Domande n. 4 – BUSTA ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Colture in vitro vegetali: metodi per ottenerle e loro applicazioni biotecnologiche.
3) Plant in vitro cultures: methods for their establishment and their biotechnological applications.

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"The free phenolic acids and flavonoids were determined with the modified method of Socha et al. (2009) by a high-performance liquid chromatography (HPLC, Merck-Hitachi, Tokyo, Japan) equipped with a UV–Vis detector. The samples were analyzed on an ODS HYPERSIL column (250×4,6 µm×5 µm, Thermo Fisher Scientific Inc, Waltman, USA) at a temperature of 30 °C. Chromatographic separation was performed with gradient elution at a flow rate of 1 mL min−1 using two solvents: A) 2.5 g per 100 mL of acetic acid, and B) acetonitrile, as a mobile phase. Phenolic acids such as gallic, vanilic, syringic were detected at λ=280 nm, while caffeic, ferulic, p-coumaric, sinapic and chlorogenic acids at λ=320 nm. Flavonoids were measured at λ=280 nm (catechin), at λ=320 nm (apigenin) and at λ=360 nm (kaempferol, quercetin and luteoin)."

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Elenco Domande n. 5 – BUSTA NON ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Approcci per l'ottimizzazione della produzione di metaboliti secondari.
3) Approaches for optimizing the production of secondary metabolites.

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"The results of HPLC analysis of methanolic extracts of analyzed seeds and sprouts showed the presence of various free phenolic compounds, which quantitative amounts are summarized in Table 3. The analysis of peaks of chromatograms revealed that among the phenolic compounds found in methanolic extracts of seeds and sprouts, gallic, protocatechuic, caffeic, p-coumaric and ferulic acids were the most abundant. Flavonoids were found only in germinated form of analyzed plants. Predominantly, germination process can increase total phenolic and flavonoid contents or individual phenolics, however, some seeds could show contrasting behavior, such as a decrease in phenolics (Cheng & Breen, 1991). This illustrates that the mechanisms of phytochemical development during germination varies between plant species (Xiang et al., 2017)."

Elenco Domande n. 6 – BUSTA NON ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Quali sono le caratteristiche ottimali, dal punto di vista nutrizionale, per un alimento a base vegetale.
3) What are the optimal nutritional characteristics for a plant-based food product?

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"Simple phenolic acids and flavonoids, the most common groups of phenolic compounds, generally occur as soluble (in methanol or its mixture with water), conjugated (glycosides) and insoluble forms. However, most of phenolic acids in plants and food occur mainly in the insoluble or bound forms as a complexes of phenolic acids with cell wall structural components, such as cellulose, hemicelluloses, lignin, pectin and rod-shape structural proteins, whereas flavonoids are present mainly as glycosides. The hydroxycynnamic and hydroxybenzoic acids form ether linkages with lignin through their OH group in the aromatic ring and ester linkages with structural carbohydrates and proteins through their carboxylic group. An alkaline hydrolysis enables to break either the ester bonds linking phenolic acids to the cell wall or the ester bonds present in esters and glycosides forms of phenolics."

Elenco Domande n. 7 – BUSTA NON ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Descrivi una tecnica adatta alla separazione e identificazione di metaboliti secondari a partire da un estratto vegetale.
3) Describe a technique suitable for the separation and identification of secondary metabolites from a plant extract.

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"The freeze-drying treatment strongly increased the sterol concentration with respect to fresh sprouts. Two factors may have contributed to this result: on one side, the extraction procedure used, which resulted in lower recovery rate for fresh sprouts; and, on the other, the increased bioavailability of such compounds caused by drying. Indeed, during freeze-drying, changes in cellular structures and also in key properties responsible for product functionality (e.g., cell membrane permeability, mechanical strength of the wall–membrane assembly, etc.) occurred, thus the extraction yield of phytosterols, which are bound to cell structures, may increase. The results obtained represent an important outcome, considering the several beneficial effects of such compounds for human or animal health: i.e., antioxidant, anti-inflammation, anti-atherogenicity and anti-cancer activity."

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Elenco Domande n. 8 – BUSTA ESTRATTA

1) Descrivere in maniera ragionevolmente sintetica, le attività di ricerca condotte e i principali risultati ottenuti durante la propria carriera, evidenziando il livello di autonomia raggiunto.
1) Briefly describe the research activities carried out and the main results achieved during your career, highlighting the level of autonomy developed.

2) Proporre come le competenze acquisite nell'arco del proprio percorso professionale si inseriscano nell'ambito delle attività del progetto per cui la posizione è stata bandita, e come queste possano contribuire a risolvere problematiche specifiche ad esso associate e/o implementarne aspetti di innovazione.
2) Explain how the skills acquired throughout your professional career align with the activities of the project for which the position has been advertised, and how they could contribute to address specific challenges related to it and/or to enhancing its innovative aspects.

3) Differenza tra analisi di metaboliti "target" e "untarget" nelle piante: quali approcci utilizzare nei due casi.
3) Difference between targeted and untargeted metabolite analysis in plants: which approaches to use in each case.

4) Quali programmi di informatica conosci e hai utilizzato durante la tua esperienza lavorativa?
4) Which software platforms are you familiar with and have used during your professional experience?

5) Traduzione/Translate:
"Phenolics in plants are primarily produced through the pentose phosphate, the shikimate, and the phenylpropanoid pathways. Phenylalanine (PAL) and tyrosine ammonia-lyase (TAL enzyme), playing a key role in the phenylpropanoid metabolisms, convert aromatic amino acids into transcinnamic derivatives, e.g. p-coumaric, caffeic, ferulic and sinapic acids (evaluated in this study). The expression of the PAL/TAL genes is regulated by a diverse array of factors, such as: injury (tissue wounding), infection (pathogenic attack), environment (e.g. light, temperature) and the developmental stage of plant, which results in and accumulation of "pathogen-related compounds", including phenolics. This phenomenon may be used for improving phenolics overproduction in plant systems."

LA PRESIDENTE
Prof.ssa Gabriella Roda

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