



ALLEGATO 1) al Verbale seduta esame-colloquio

VERBALE DELLA RIUNIONE IN SECONDA CONVOCAZIONE DELLA COMMISSIONE ESAMINATRICE ISTITUITA CON DETERMINA DIRETTORIALE UFFICIO VE 1, AL REGISTRO UFFICIALE CREA N. 0028780 DEL 29/03/2021-I, PER L'ESPLETAMENTO DELLA PROCEDURA SELETTIVA PUBBLICA NAZIONALE, PER TITOLI ED ESAME COLLOQUIO IN MODALITÀ TELEMATICA, FINALIZZATA AL CONFERIMENTO DI N. 1 BORSA DI STUDIO PER LAUREATI (LAUREA TRIENNALE O TITOLI UNIVERSITARI SUPERIORI) DELLA DURATA DI 18 (DICIOOTTO) MESI, SULLA TEMATICA "MONITORAGGIO DATI VEGETO-PRODUTTIVI E VALIDAZIONE DEI MODELLI IN RELAZIONE AGLI ASPETTI VITICOLI", NELL'AMBITO DELLE ATTIVITÀ PREVISTE SU PROGETTO DENOMINATO "PROSIT" (CUP PROSIT - PSR TOSCANA: C14I20000210002; CUP ARTEA REGIONE TOSCANA: 863769; OBIETTIVO FUNZIONE: 1.05.99.38.00.C). SEDE DI ASSEGNAZIONE DEL VINCITORE È IL CENTRO DI VITICOLTURA ED ENOLOGIA DI AREZZO, SITO IN VIALE SANTA MARGHERITA, 80.

CODICE DELLA SELEZIONE: PROSIT/1BORSA/VE/AR/2020.

Riferimenti:

- *Determina Direttoriale di indizione della selezione pubblica n. 611 del 23.11.2020;*
- *Bando integrale di concorso, comprensivo di Allegati, al Registro Ufficiale CREA n.0098784 del 22 dicembre 2020-U, pubblicato sul sito istituzionale del CREA in data 12 gennaio 2021;*
- *Avviso di selezione sulla G.U.R.I. – IV Serie Speciale – Concorsi ed Esami, n. 3 del 12 gennaio 2021;*
- *Termine di scadenza per la presentazione delle domande di partecipazione: lunedì 1° febbraio 2021;*
- *Progetto denominato "Prosit" (CUP PROSIT-PSR TOSCANA: C14I20000210002; CUP ARTEA REGIONE TOSCANA: 863769; OB.FU.: 1.05.99.38.00.C);*
- *Provvedimento direttoriale di nomina della Commissione di concorso al Registro Ufficiale CREA n. 0028780 del 29.03.2021-I;*
- *Delega del Presidente della Commissione esaminatrice al Segretario, Registro Ufficiale CREA n. 0031533 del 6.04.2021-E;*
- *Allegato 1) al Verbale della riunione in prima convocazione della Commissione, Registro Ufficiale CREA n. 0031769 del 07-04-2021-I;*
- *Verbale della riunione in prima convocazione della Commissione esaminatrice, Registro Ufficiale CREA n. 0032080 del 07-04-2021-I.*

TEMATICA DELLA BORSA DI STUDIO A CONCORSO:

"MONITORAGGIO DATI VEGETO-PRODUTTIVI E VALIDAZIONE DEI MODELLI IN RELAZIONE AGLI ASPETTI VITICOLI"

VIENE DI SEGUITO RIPORTATO L'ELENCO DEI QUESITI CONTENUTI NELLE 30 BUSTE PREDISPOSTE DALLA COMMISSIONE ESAMINATRICE, COMPRESIVO DEL BRANO IN INGLESE:

DOMANDE BUSTA N. 1

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Cenni sui sistemi di potatura invernale della vite.

C – Applicazioni pratiche di viticoltura di precisione.



D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Precision viticulture aims to optimize vineyard management, reducing the use of resources, the environmental impact and maximizing the yield and quality of the production. New technologies as UAVs, satellites, remote and proximal sensors, robotics, DSS, wireless sensor network and variable rate machines are being developed and used more and more frequently in recent years thanks also to informatics systems able to read, analyze and process a huge number of data in order to give the winegrowers a decision support system for making better decisions at the right place and time.

DOMANDE BUSTA N. 2

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Cenni sulle metodiche di valutazione dell'attività vegeto-produttiva del vigneto.

C - Tecniche di intervento per il miglioramento della fertilità dei suoli.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Precision agriculture (PA) is defined as an agricultural, forestry and livestock management based on the observation, measurement and response of the set of inter and intra-field quantitative and qualitative variables that act in agricultural productions. This is in order to define a decision support system for the entire farm management, with the aim of optimizing yields looking at climate, environmental, economic, productive and social sustainability. The synthesis of this definition was effectively given by Pierce and Novak, who identified PA with “doing the right thing, in the right place at the right time”. The starting point of the PA process is the collection of data, which can be done through proximal or remote sensors. Then, these collected data are interpreted and evaluated by an agronomic point of view in order to traduce them into manual implementations or into inputs for variable rate technology machines, which are able to perform the prescribed actions in a semi-automatic or fully automatic way.

DOMANDE BUSTA N. 3

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Principale strumentazione per il monitoraggio dello stress idrico nel vigneto.

C – La distribuzione dei fertilizzanti secondo il concetto di “viticoltura di precisione”.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

The adoption of Precision Agriculture (PA) implies to adapt agronomic inputs like fertilizers, pesticides and water according to the specific needs of each area of the field.

The practical implementation of PA can be done using various technologies: crop and yield sensors, proximal and remote sensors, GNSS (global navigation satellite system) sensors, VRA (variable rate application) equipment and VRT machines, GIS (geographic information systems) systems for data analysis and interpretation.

The real strength of PA lies in the use of all these technologies in combination with each other, so that each phase of cultivation is monitored in order to make targeted and effective decisions.

DOMANDE BUSTA N. 4

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Modalità di intervento per limitare gli stress idrici nel vigneto.

C - Interventi per il miglioramento della fertilità dei suoli secondo i concetti dell'Agricoltura di precisione.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:



Regione Toscana



One of the sectors most sensitive to the application of Precision Agriculture technologies is viticulture. In fact, in viticulture, it is common to find that within the same vineyard there are areas characterized by different soil composition and structure, by different concentration of humidity, by different solar exposure and microclimate: to these differences the vine responds accordingly, highlighting different physiological expressions. Vegetative vigor is the most obvious of these responses, which can be assessed by vegetation indices like the NDVI (normalized difference vegetation index).

DOMANDE BUSTA N. 5

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Cenni sui rapporti tra cambiamenti climatici e viticoltura.

C – Concetto di “viticoltura di precisione”.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

The main goal of precision viticulture (PV) is to assess health, vigor and physiological needs of the vines belonging to different areas of the vineyard in order to adapt the standard cultivation techniques in a more site-specific and time-specific manner. To achieve this, winegrowers have to use IT tools able to manage a huge number of data in a totally or almost totally automated way. The collection of georeferenced spatial datasets provides winegrowers with the opportunity to optimize the decision-making process by using several management techniques used to minimize the yield variability but also to take advantage of this variability for improving grape/wine quality, while saving on management and input costs. About economic savings, many researchers have demonstrated that the implementation of PV can increase grapes quality and yield along with savings in production costs.

DOMANDE BUSTA N. 6

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – La sintesi degli zuccheri nelle piante.

C – Tecniche di gestione per il miglioramento della fertilità dei suoli.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Research areas of Precision Viticulture have focused on four main specific fields:

1. quantification and evaluation of intra-field variability;
2. delimitation of differential treatment areas at parcel level, based on the analysis and interpretation of this variability;
3. development of variable rate technologies;
4. evaluation of opportunities for site-specific vineyard management.

Research in these fields allows winemakers, oenologists and agronomists to know and understand the variability within the same field, which are the causes of this variability, how yield and quality are correlated with it and if the site-specific management of the vineyard is justifiable on a technical and economic basis.

DOMANDE BUSTA N. 7

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Interventi per il controllo della produzione di uva.

C – Principali caratteri pedologici che influenzano le produzioni viticole.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:



Precision Agriculture (PA) is a relatively new discipline that was developed in a more scientific way only in the mid-1980s and it has been listed in the top ten agricultural developments in recent decades.

PA has spread out mainly thanks to four factors:

1. the availability of accurate and cheap global navigation satellite systems (GNSS);
2. the development of GIS software to visualize/analyze spatial and geographical data;
3. the growing availability of georeferenced information acquired remotely;
4. the development of variable rate technologies (VRT).

The first known and recorded attempt of implementing PA was in the 1920s when Linsley and Bauer sampled the soil pH to create a prescription map of a corrective dose (limestone) which was then distributed by hand.

DOMANDE BUSTA N. 8

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Principali interventi tecnici sulle chiome della vite.

C – Cenni sui sistemi di supporto alle decisioni (DSS).

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

During the 1990s, GPS for civilian use came available, allowing for GNSS guidance in tractors. Additionally, the first VRT fertilizer was used and satellite and aerial images were used to discriminate areas with different characteristics in the field. During this period, optical sensors mounted on farm machinery were starting to be used to monitor the vegetative vigor. At the end of the century, the ISOBUS standard, a communication protocol between tractors and operating machines, was developed. In the last 20 years, the new big protagonists are satellites and UAVs (unmanned aerial vehicles or drones), which have made it possible to have low-cost images at a very high resolution.

DOMANDE BUSTA N. 9

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Problematiche connesse alla gestione del suolo nel vigneto.

C - Cenni sul rapporto tra ambienti di produzione e qualità dell'uva e dei vini.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

The implementation of Precision Viticulture (PV) techniques is relatively recent and occurred much later than other crops and only after the mid-2000s. This delayed start is due not to the lack of interest by winegrowers, but to difficulties intrinsically associated with the characteristics of the vineyard, such as a canopy with a discontinuous character and an organization in rows, which requires a very high resolution of the images to discriminate the canopy from the soil and a big data processing capacity to manage the spatial information before use.

The most relevant aspects that must be taken into account in the PV include the optimization of inputs, differential grape harvesting to produce higher quality wines, yield forecasting and greater accuracy and efficiency of canopy/soil sampling conducted at parcel level.

DOMANDE BUSTA N. 10

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Nozioni di fertilità agronomica.

C - Cenni sui sistemi di supporto alle decisioni (DSS).

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:



The remote sensing systems are characterized by optical sensors like visible cameras (RGB), multispectral sensors, that detect specific bands for the analysis of vegetation, thermal sensors, useful for measuring the temperature of plants and identifying water stress, and hyperspectral sensors, which allow to carry out in-depth analyzes on crops and for the study of diseases.

Remote sensing technologies, like satellites and UAVs, have been widely used to assess management zones in vineyards in order to increase the wine quality and to estimate berry phenolics and color at harvest.

DOMANDE BUSTA N. 11

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Principali elementi nella concimazione del vigneto.

C – Esempi di interventi tecnici per migliorare la sostenibilità ambientale delle produzioni.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Satellites have been used in Precision Agriculture for over 40 years, when Landsat 1 was launched in 1972. It was equipped with a multispectral sensor and provided a spatial resolution of 80 m with a revisit time of approximately 18 days. The first application in PA of Landsat images was to estimate the spatial distribution for soil organic matter content.

The last launched Landsat mission satellite is the Landsat 8, which operates in the visible, near-infrared, short wave infrared and thermal infrared spectrums.

The use of satellites in remote sensing has great potential, but spatial resolutions are not sufficient for Precision Viticulture due to the presence of the inter-rows and the width of the rows themselves, which are less than one meter thick. Image processing in order to remove the soil and inter-row pixels is a rather complicated operation and intrinsically not possible with image resolutions greater than 0.5 m. Another limitation is due to the temporal resolution and cloud cover that can occur at the time of satellites data capture.

DOMANDE BUSTA N. 12

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – La potatura invernale della vite.

C – Tecniche di intervento per limitare l'erosione dei suoli nel vigneto.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

One of the most used satellites in Precision Agriculture is the Sentinel-2. It carries an optical instrument called MSI (multi-spectral instrument) capable of sampling 13 spectral bands down to a resolution of 10 m. The main advantage of the Sentinel-2 with respect to other satellites is that the data are open-source, so totally free of charge and freely downloadable from various websites.

Another high-resolution satellite is the RapidEye, which acquires images in 5 multispectral bands (blue, green, red, red edge, near infrared) at a resolution of 5 m. RapidEye has been used to evaluate NDVI in order to characterize the vine vigor and some technological and phenolic parameters. Simple linear relationships between NDVI at berry set, pre-veraison and ripening has been found to evaluate sugar content and anthocyanins at harvesting. RapidEye has also been used to evaluate the LAI in "tendone" vineyards demonstrating a good correlation with in-field estimation.



DOMANDE BUSTA N. 13

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Rapporto tra superficie fogliare e produzione della vite.

C – Potenziali parametri utili per la realizzazione di un DSS per la gestione dei suoli.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Aircrafts allow to monitor large areas with a long flight range and also by carrying heavy and big payloads, thus providing the ability to manage multiple sensors at one time. Aircrafts bypass some limitations of satellites by scheduling image time capture and providing higher ground resolution (down to 10 cm), depending on the flight altitude. However, the reduced flexibility of time acquisition, due to the rigid flight schedule, and high operating costs, makes it economically feasible only on areas bigger than 10 ha. Additionally, as for UAVs, aircrafts undergo the National Civil Aviation Authority in force, so that the pilot has to be licensed and authorized to fly over the survey zone. Infact, in each country, there are zones not flyable like prisons, military buildings or areas, airports, sensitive targets, restricted, prohibited and dangerous areas. Each Civil Aviation Authority publishes detailed maps and lists about these areas in order to inform pilots if in the targeted survey zone there are some aerial activities and in which flight altitudes range, hours, days and months they can take place.

DOMANDE BUSTA N. 14

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Le principali forme di allevamento della vite.

C – La gestione della vigoria del vigneto secondo i concetti dell'Agricoltura di precisione.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

With the increasing competitiveness in the wine market, along with the increasing need for sustainable use of resources, the optimization of farm management is becoming essential. Thanks to photogrammetric techniques and to technological development in the field of automation, images acquired from unmanned aerial vehicles (UAVs or drones) can provide valuable information to winegrowers, giving a support to decision-making processes. These fixed or rotary wings platforms are able to fly autonomously thanks to flight software or apps and can be controlled remotely by a ground pilot. UAVs embed flight control sensors (gyroscopes, compass, GPS, pressure sensor and accelerometers) controlled by a microprocessor. These platforms can be equipped with a variety of sensors, allowing a wide range of monitoring tasks to be performed. UAVs enable a very high spatial resolution on the ground (down to cm) and the possibility of highly flexible and timely monitoring, thanks to the reduced planning times.

DOMANDE BUSTA N. 15

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Influenza dei principali parametri climatici sulla viticoltura.

C - Potenziali parametri utili per la realizzazione di un DSS per la gestione del suolo nel vigneto.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

With respect to satellites, UAVs have a much higher resolution, thus some considerations have to be done when assessing for vigor or water stress in tree crops as vineyards. Generally, the use of UAVs with high-resolution sensors instead of satellites is suggested due to the tree structure and inter-rows spacing of vineyards, which significantly



affect the capacity to detect variability by sensors. Satellites images with different resolutions have been demonstrated to show similar behavior in assessing vineyards variability but not as good as UAV, unless high-resolution satellites are used. Additionally, bare soil has a negative effect on assessing vineyard vigor, while weeds or grassing tend to increase the actual vigor. In this way, a pixel containing vigorous plants plus bare ground would describe a less than real situation and incorrect vigor maps would be generated. UAVs can provide images with a high detail that discriminates the row from the inter-row, thus providing pure pixels of only canopy, as opposed to satellites in which the pixels of higher dimensions incorporate both canopy and soil or grassing, thus altering the actual plant vigor or temperature.

DOMANDE BUSTA N. 16

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Effetto della giacitura e dell'esposizione sulle produzioni del vigneto.

C – Interventi tecnici per il miglioramento della fertilità dei suoli.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

the UAV platforms have two important limitations: the first is the autonomy, which is usually less than 30 min for rotary-wings UAVs and 60 min for fixed-wings UAVs, while the second is operational. In fact, in order to fly safely according to the National Civil Aviation Authority in force, the UAV pilot is required to have a suitable flight license and civil liability insurance in case of accidents and damage to third parties. The UAV must also be registered on appropriate platforms (each country has its own one), which issues a sort of “license plate” that must be applied to the UAV in order to make it recognizable.

Lightweight commercial UAVs with RGB, multispectral and thermal sensors are already available at prices lower than 10,000 €. These UAVs usually weigh less than 5 kg and are equipped with a sensor sensitive to sunlight, positioned on the upper part of the body, which captures the solar radiation in order to maximize the accuracy of the data collected over different times of day and year.

DOMANDE BUSTA N. 17

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Cenni di fotosintesi.

C - Potenziali parametri utili per la realizzazione di un DSS per l'impianto del vigneto.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

The knowledge of the spatial and temporal variability of the characteristics of vegetation and soil has important implications in many areas of production activities and environmental monitoring. The need to monitor changes in the state of the crops over time and space has led to the development of alternative sensing techniques with respect to conventional destructive and invasive methods, which also provide limited spatial coverage.

Through these techniques, it is possible to obtain information quickly and relatively at low cost regarding soil, vegetation cover, nutritional status, efficiency of the photosynthetic system and the evapotranspiration process, water status, concentration of pigments, phytosanitary status and production response. However, proximal sensors require site-specific calibrations and, in some cases, the data analysis can be complex.

DOMANDE BUSTA N. 18

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Funzione degli apparati radicali.

C - Cenni sull'impiego degli strumenti webGIS in viticoltura.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:



The use of proximal sensors operating in the optical domain is based on the measurement of the electromagnetic radiation reflected or emitted by bodies and it can allow the rapid collection, in a non-destructive way and on large surfaces, of important information for the indirect measurement of the vegetation state.

The spectral response of vegetation is characterized by some characteristic features, mainly related to the radiation absorption by the pigments, which allows the identification of the presence of vegetation cover but also the characterization of its health state.

These reflectance characteristics are the basis for the use of proximal sensors for crops monitoring and management. In fact, particularly relevant is the strong contrast in reflectance between red and near infrared bands and the consequent behavior of the spectral response in the transition region, i.e., red-edge. This region, located between 680 and 750 nm, is highly sensitive to variations in the physiological state of the plants.

DOMANDE BUSTA N. 19

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B - Principali parametri di valutazione della qualità dell'uva.

C - Potenziali parametri utili per la realizzazione di un DSS per l'impianto del vigneto.

D - Lettura e traduzione in italiano del seguente testo in lingua inglese:

VitiCanopy is one of the most used apps to measure the leaf area index (LAI) in vineyards through images acquired by a smartphone/tablet. Available for iOS operating systems, the app allows to calculate both the LAI and the porosity of the canopy in order to quickly and easily monitor the growth of the vines and the vigor of the vineyards.

The LAI, defined as the ratio between the total leaf surface and the surface of the soil on which the leaves are projected, is a very important measure in defining the vegetative- productive balance of the vineyard. The LAI can be measured with direct methods, which consist in destructive sampling of the leaves and their scanning, to obtain the total surface, or by weighting the samples to get the relationship between leaves area and leaves weight. These direct methods are normally quite accurate; however, they are destructive and very labor-intensive. Indirect methods are faster and based on photographic tools; however, they often require specialized personnel and they are quite expensive.

DOMANDE BUSTA N. 20

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B - Effetti della temperatura sulla maturazione dell'uva.

C - Interventi operativi per il miglioramento della fertilità dei suoli.

D - Lettura e traduzione in italiano del seguente testo in lingua inglese:

An important application of PV techniques is the proximal monitoring of soil variability, which includes the use of a wide range of sensors. The measurement of the electrical conductivity (EC) of the soil can be done by mobile platforms equipped with electromagnetic sensors and GPS. It is strongly correlated with many soil properties, such as texture and depth, water retention capacity, organic matter content and salinity.

The sensors used for this type of measurements are electrical resistivity sensors (invasive) or electromagnetic induction sensors (non-invasive). The first type is used to check the resistivity (i.e., the inverse of the conductivity) of a given type of soil, generating electrical currents in the soil with an electrode and then measuring the potential difference thanks to a second receiver electrode.

DOMANDE BUSTA N. 21



A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Tecniche di irrigazione del vigneto ed epoche di intervento.

C - Cenni sull'impiego degli strumenti webGIS in viticoltura.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Non-destructive monitoring of grape quality parameters is based on optical sensors designed as manual devices, i.e., tools carried by an operator, used for proximal georeferenced measurements.

Multiplex is a portable multiparametric fluorometer dedicated to the measurement of grapes and leaves parameters. By means of 4 excitation wavelengths and 3 sensing wavelengths, the Multiplex measures up to 9 fluorescence signals.

In addition to these signals, Multiplex also assess plant physiological indices related to the content of chlorophyll, flavanols and anthocyanins in the leaves and grapes.

Multiplex was mainly introduced to estimate the nitrogen status of grapevine leaves. About this, on-field measurements have found reliable correlations between the nitrogen balance index in leaves, the nitrogen in the must, wood pruning and leaves biomass.

DOMANDE BUSTA N. 22

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Elenco ed epoche delle principali fasi fenologiche della vite.

C - Cenni sul rapporto tra suolo e produzioni viticole.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Soil properties play an important role in viticulture, since knowing the spatial variability of soil characteristics allows a better understanding of the variability of the physiological response of the vines. The spatial variability of soil characteristics within a vineyard can be mapped at high detail by proximal sensing methods through the use of different type of sensors, like spectrometers, georesistivimeters and electromagnetic induction sensors.

This is particularly important in PV, since the homogeneous zone mapping within one or more vineyards allows differentiating the grapes on the basis of their potentiality and typicality, highlighting the “terroir effect” over the years.

In addition, during the planning of new vineyards, accurate information about soil features and their spatial variability are usually needed.

DOMANDE BUSTA N. 23

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Metodiche analitiche per il monitoraggio della maturazione dell'uva.

C - I modelli previsionali delle principali malattie della vite.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

The most commonly used sensors for the proximal detection of the characteristics of soils are the geophysical ones, which are based on the introduction of a current into the soil and the measurement of its potential drop, that is in turn directly related to the EC of the soil itself.

Geophysical sensors allow to analyze the soil and characterize it in terms of EC, texture, organic matter content and moisture. In fact, each type of material has its own specific EC, so that from the measurement of this parameter the characteristics of the soil can be assessed.

For example, the rocky substrate has EC values generally lower than 2–3 mS /m, sand has values between 1 and 10 mS /m, clay between 25 and 100 mS/m, while water can vary the EC depending on the dissolved salts from a few mS /m up to about 1000 mS /m.

DOMANDE BUSTA N. 24



A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Principali tecniche di gestione del suolo nel vigneto.

C – Nozioni di WebGIS.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Geophysical sensors can be invasive (mobile soil resistance-meters), which measure the apparent resistivity of the soil by using direct contact electrodes, or non-invasive (electromagnetic induction sensors, ground penetrating radars), which allow to assess different soil properties (texture, water content, depth, porosity, etc.) by using electromagnetic fields. The electromagnetic induction sensor consists of two magnets, in which the primary emits a magnetic field, that generates an induced current in the soil, while the secondary one receives the magnetic field generated by these induced currents: the ECa of the soil is proportional to the ratio between the two magnetic fields.

DOMANDE BUSTA N. 25

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Principali forme di allevamento della vite.

C – Cenni sull'impiego degli strumenti WebGIS in viticoltura.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Spectroradiometers are tools capable of detecting variations in mineralogy and chemistry of soils up to 50 cm of depth. These sensors can be gamma-ray or vis-nir reflectance based. The first type (i.e., gamma-ray spectroradiometers) consists of a scintillator crystal, generally made of cesium iodide or sodium iodide, which emits photons when hit by gamma rays. The use of this tool is optimal when the main cause of soil variability is already known, for example, the type of substrate, surface stoniness or soil texture. Gamma-ray spectrometry is usually adopted to analyze large areas, in order to map the variability of soils linked to the first substrate, but also to scan small areas for detailed analysis of texture, surface porosity and carbonates.

DOMANDE BUSTA N. 26

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Principali sistemi di potatura della vite

C – Nozioni sui WebGIS.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Vis-nir reflectance spectroradiometers are gaining importance as they have advantages over other measurement methods. Firstly, this technique is rapid, relatively cheap, requires less sample preparation time and does not require the use of chemical reagents. Secondly, numerous soil properties can be quantified simultaneously, directly or indirectly, by a single scan. Finally, it can be used both in the laboratory, under controlled lighting conditions, or adapted to carry out measurements in the field, in stationary or mobile (continuous) conditions. With this tool it is possible to study the organic matter content, the water content, the soil texture and the mineralogical characteristics. Numerous researches have also concerned the quantification of the availability of nutrients, in particular macronutrients, pH, cation exchange capacity, structural properties, fractions of organic matter.

DOMANDE BUSTA N. 27



A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – La gestione estiva della chioma.

C – Cenni sul concetto di “Terroir” viticolo.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Non-destructive monitoring of grape quality parameters is based on optical sensors designed as manual devices, i.e., tools carried by an operator, used for proximal georeferenced measurements.

Multiplex (Force-A) is a portable multiparametric fluorometer dedicated to the measurement of grapes and leaves parameters. By means of 4 excitation wavelengths and 3 sensing wavelengths, the Multiplex measures up to 9 fluorescence signals.

In addition to these signals, Multiplex also assess plant physiological indices related to the content of chlorophyll, flavanols and anthocyanins in the leaves and grapes.

Multiplex was mainly introduced to estimate the nitrogen status of grapevine leaves. About this, on-field measurements have found reliable correlations between the nitrogen balance index (NBI) in leaves, the nitrogen in the must, wood pruning and leaves biomass.

DOMANDE BUSTA N. 28

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Caratteristiche dei principali vitigni coltivati in Italia.

C – I modelli previsionali delle principali malattie della vite.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Variable rate technology (VRT) machines allow to make more precise and automated field operations based on a prescription map expressed in doses of fertilizer, water, pesticide or defoliation rate. The harvesting operation can also be performed using a VRT machine with two hoppers that collect grapes of different quality.

The aim of carrying out VRT operations is to optimize the release of chemical inputs and to reduce the variability of the vineyard, trying to make it more homogeneous in terms of vigor. Additionally, the application of VRT for harvesting can increase the wine quality by collecting grapes coming from different vigor zones in different hoppers.

DOMANDE BUSTA N. 29

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B – Le principali malattie fungine della vite.

C – Potenziali parametri utili per la realizzazione di un DSS per la gestione del suolo nel vigneto.

D – Lettura e traduzione in italiano del seguente testo in lingua inglese:

Robotics applied to agriculture will be the most important challenge of the next 10 years. In fact, these technologies will improve and automate agricultural processes, in view of the increase in world population and food needs, restrictions on pesticides and to increase eco-sustainability, in line with the European Green Deal and the “Farm-to-Fork” Strategy of the European Commission, and in the case of labor shortages, a very common problem in agriculture. The use of robotics in Precision Viticulture is still at a prototype stage, but driverless agricultural robots (farmbots) are considered the future of agriculture.

In recent years, there has been an important effort to find efficient innovative robotic technologies in agriculture, but the costs to implement these technologies are high: In the near future, it is foreseen an exponential increase of high-performance solutions at lower costs than the actual ones, which are between 50,000 and 120,000€, depending on the type of sensors mounted.



DOMANDE BUSTA N. 30

A - Il candidato illustri il proprio Curriculum, con eventuali riferimenti alle attività previste dal progetto PROSIT.

B - I portinnesti della vite.

C - Utilità degli strumenti webGIS nella gestione degli interventi in agricoltura.

D - Lettura e traduzione in italiano del seguente testo in lingua inglese:

DSS (decision support systems) consist of at least five main components:

- a system for acquiring data relating to the cultivation environment, from multiple sources, which flow asynchronously to the DSS;
- a structure of interdependent databases that collects, organizes and performs a quality control of this data;
- sophisticated analysis algorithms (i.e., mathematical models) that allow the transition from raw data to processed data;
- automatic interpretation procedures that allow to pass from the processed data to the agronomic advice;
- a graphical interface that allows the user to access and interact with the DSS.

Il presente Allegato 1) contenete i 30 (trenta) moduli di domande, ciascuno di n. 3 quesiti e un brano in lingua inglese, di cui alle altrettante buste predisposte dalla Commissione in anticipo sulla seduta odierna, da fare scegliere a ciascun candidato che si è presentato a sostenere l'odierno esame orale, consta di n. 12 pagine e costituisce parte integrante del Verbale della seduta di svolgimento dell'esame colloquio.

Letto, approvato e sottoscritto.

Addì, 20 aprile 2021

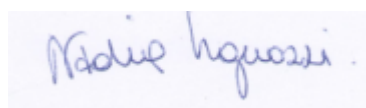
Letto, approvato e sottoscritto.

LA COMMISSIONE

Il Presidente Prof. Giovan Battista Mattii



I Componenti Dott.ssa Nadia Vignozzi



Dott. Paolo Storchi



Il Segretario Dott.ssa Daniela Oliva

