

【問題用紙】

令和8年度 愛媛大学大学院農学研究科入学者選抜学力検査

( 食料生産学専攻 植物工場システム学コース )

外国語

第 1 頁 ( 4 頁の内 )

問 1~4 に答えよ。解答は解答用紙に記入すること。

問 1. 以下の英文と日本語の意味が同じになるよう、それぞれの文の括弧内に適切な単語または語句を書き入れ、文章を完成させよ。(15 点)

(1) High daytime temperatures or low night temperatures prevent ( a ).

日中の気温が高い、または夜間の気温が低いと受粉が妨げられます。

(2) Traditional low-density old olive groves are being replaced by high-density young orchards to increase productivity.

( b ) を高めるために、伝統的な低密度の ( c ) オリーブ畑は ( d ) の若い果樹園に ( e ) つつあります。

(3) During the annotation process, apple occluded by ( f ) tree trunks or ( g ) near orchard wires were labeled as ( h ).

アノテーションの際、太い木の幹に隠れたリンゴや果樹園のワイヤー付近にあるリンゴは、重要ではないものとしてラベル付けされました。

(4) Croplands are not expanding in the same rate as the population growth. Salinity and desertification are indeed factors contributing to a reduction in the land area suitable for agriculture.

農地の拡大は ( i ) と同じ速さで起こっていません。( j ) と ( k ) は、確かに農業に適した耕地面積の量を減少させる要因となっています。

(5) ( l ) is the process of water movement from a plant in the form of ( m ). Water absorbed by roots from the soil is ( n ) as a liquid to the leaves or stems via ( o ).

蒸散とは、植物が水蒸気の形で水分を失うことです。水は土壌から根によって吸収され、液体として木部道管を通過して葉に運ばれます。

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第 2 頁 ( 4 頁の内 )

問2. 次の語句について、日本語は英語に、英語は日本語にそれぞれ書きかえよ。

(10点)

- (1) Photosynthetic rate
- (2) 日射量
- (3) Stress response
- (4) 栽植密度
- (5) Solvent
- (6) 絶縁
- (7) Volatile
- (8) 波長
- (9) Sterilization
- (10) 人工知能

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第 3 頁 ( 4 頁の内 )

問3. 次の英文をすべて日本語に和訳せよ。(45点)

Plant production is driven by light, temperature, and evaporation, generally described as the climate. In outdoors, these are intimately linked as the sun provides light as well as heat. Conventional greenhouse growers are in a constant battle with the climate, as this is a continuous uncertainty. The ability to grow plants in an indoor farm requires many controlling mechanisms. Good growers handle controlling mechanisms very well and they know how to control the impact on their crops. The climate in an indoor farm (greenhouse) is very stable, with no need to consider the outside situation. Growers can therefore focus more on crop management and maintenance of the technical operation and equipment.

From the plants' points of view, outdoor environment can be a horrible place. Plants in an outdoor environment often face various challenges, such as extreme temperatures (too hot or too cold), inconsistent light (too much, too little, and the day/night cycle), water imbalances, nutrient imbalances, and threats from wind, insects, and grazing<sup>\*1</sup> animals. Ideally, plants would want a stable environment with consistent temperatures, air and water flow, and sufficient nutrients and light. Plants would likely not prefer sunlight, as 50% of that light is heat they must dissipate through evaporation. This is how leaves maintain a constant temperature, and since the upper layers of leaves catch most of the sunlight, they are the ones that need to dissipate the most heat.

This temperature control mechanism is key to regulating growth and development, but it causes outdoor plants to use a significant amount of water. Because water uptake by roots is a passive process that follows nutrient uptake, the balance between water uptake and evaporation greatly impacts the plant's survival. For example, a high root pressure combined with low evaporation will result in a higher water content within the plant.

(出典: T. Kozai (ed.). Smart Plant Factory. Springer Nature Singapore Pte Ltd. 2018.より抜粋、一部改変)

<sup>\*1</sup>grazing: 放牧

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第 4 頁 ( 4 頁の内 )

問 4. 次の英文を読み、下線を引いた 3 カ所の文について和訳し、それぞれ解答欄(1)~(3)に記入せよ。(30 点)

1)Autonomous navigation of agricultural robots and vehicles in agricultural environments is a prerequisite\*<sup>1</sup> for the accomplishment of various tasks. However, precision navigation of agricultural robots is still a challenging issue due to the complex nature of the agricultural environment. With the development of electronics and information technology, machine vision technology has become a promising tool for real-time and accurate navigation of agricultural robots.

Due to low hardware cost and rich visual information, machine vision technology has been intensively studied and widely used in the field of autonomous

navigation agricultural robots. 2)Environment perception\*<sup>2</sup> mainly includes crop/tree detection, obstacle avoidance and terrain traversability\*<sup>3</sup> assessment. The reliability of the visual navigation system for agricultural robots requires deep consideration about the working environment and scene, as well as the correct choice of vision sensors and vision systems. In order to obtain environmental information, agricultural robots are equipped with various types of vision sensors and image analysis algorithms.

3)The future development of vision-based navigation systems for agricultural robots will focus on advanced deep learning frameworks, high precision 3D map reconstruction, multi-sensor fusion methods and multi-robot collaboration methods. In summary, machine vision is a widely applied and promising navigation system for agricultural robots. Despite there are still many challenges, the future is promising because there are many researchers dedicated to this work.

(出典: Bai Y., Zhang B., Xu N., Zhou J., Diao Z. (2023). Vision-based navigation and guidance for agricultural autonomous vehicles and robots: A review. *Computers and Electronics in Agriculture*, 205,107584 より抜粋、一部改変)

\*<sup>1</sup>prerequisite: 前提条件、\*<sup>2</sup>environment perception: 環境知覚、

\*<sup>3</sup>terrain traversability: 地勢踏破性