一、 請說明乙烯與離層酸之生理作用有何異同?(10 分)

二、 請說明植物由根部吸收水分運送至莖頂的機制。為何葉片產生泌液 (guttation)現象? 缺水對葉面積與 root/shoot ratio 之影響為何? (10 分)

三、 請說明園藝作物新葉/老葉葉脈間黃化的原因與改善方法。(10 分)

四、 請說明耐熱之園藝作物品種具哪些形態、解剖與生理特性? (10 分)

五、 試說明溫度與光線對園藝作物開花時間與品質之影響。(10 分)

六、 請閱讀以下報告後，以中文回答下列問題：(25 分，每小題 5 分)

The effects of daylength and temperature on flowering of the cultivated octoploid strawberry (*Fragaria x ananassa* Duch.) have been studied extensively at the physiological level, but information on the molecular pathways controlling flowering in the species is scarce. The flowering pathway has been studied at the molecular level in the diploid short-day woodland strawberry (*F. vesca* L.), in which the *FLOWERING LOCUS T1 (FvFT1)–SUPPRESSOR OF OVEREXPRESSION OF CONSTANS1 (FvSOC1)–TERMINAL FLOWER1 (FvTFL1)* pathway is essential for the correct timing of flowering. In this work, we show by transgenic approach that the silencing of the floral repressor *FaTFL1* in the octoploid short-day cultivar 'Elsanta' is sufficient to induce perpetual flowering under long days without direct changes in vegetative reproduction. We also demonstrate that although the genes *FaFT1* and *FaSOC1* show similar expression patterns in different cultivars, the regulation of *FaTFL1* varies widely from cultivar to cultivar and is correlated with floral induction, indicating that the transcription of *FaTFL1* occurs at least partially independently of the *FaFT1–FaSOC1* module. Our results indicate that changing the expression patterns of *FaTFL1* through biotechnological or conventional breeding approaches could result in strawberries with specific flowering and runnering characteristics including new types of everbearing cultivars

1. 現代栽培種草莓染色體倍數為多少?
2. *FaTFL₁* 功能為何?
3. 將靜默後的 *FaTFL₁* 轉殖入栽培種草莓會發生什麼事?
4. 為何文中說 *FaTFL1* 在草莓上的表現可能非完全如一般認知中的 *FaFT1–FaSOC1* module？
5. 文末的 everbearing cultivars 所指為何?

七、 請閱讀以下報告後，以中文回答下列問題：(25 分，每小題 5 分)

Vivipary is commonly observed in many mangroves, wherein the seeds germinate and seedlings grow while still attached to their mother plant before dropping down to establish themselves or be transported elsewhere. Morphological, ecological and physiological explanations have been put forward to explain why so many mangrove species demonstrate vivipary. However, vivipary is rarely reported in flowering plants accounting for less than 0.1% of the angiosperms. Here, we document the occurrence of cryptovivipary in *Capsicum annuum* L. cv. California Wonder, and leave clues for further research on understanding the viviparous nature in *capsicum* and its ecological and evolutionary significance. Cryptovivipary (Greek kryptos, hidden) is the condition in which the embryo grows to break through the seed coat but not the fruit wall before it splits open. The potential of chemical seed priming is being studied to impart abiotic stress tolerance in crop plants. In the seed priming experiment, capsicum seeds were treated with various chemical priming agents like calcium chloride (50 mM), hydrogen peroxide (1.5 mM), potassium nitrate (300 mM), abscisic acid (ABA, 100 μM), polyethylene glycol (PEG 6000;

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16.7 mM), thiourea (1.3 mM), sodium chloride (50 mM) and copper sulphate (5 mM) for 24 h pregermination. The primed seeds in general exhibited faster germination and better seedling establishment as well as imparted tolerance to subsequent exposure to cold (4°C) stress than the control. The plants obtained from chemically primed seeds were grown inside a partially controlled (temperature 27 ± 2°C; relative humidity 50%) greenhouse situated at Haldwani (lat. 29.2°13′N, long. 79.5°31′E). The seeds in the fruits harvested from plants grown from seeds primed with potassium nitrate, hydrogen peroxide, ABA and calcium chloride exhibited viviparous germination. Whereas fruits harvested from the plant grown from control (nonprimed), hydro-primed or other chemically primed seeds did not show vivipary. Seeds in several stages of germination, viz. tiny embryos emerging from the seed coat to young seedlings with small cotyledons, elongated hypocotyls and radicals were observed in mature fruits, while they were still attached to the mother plant. On transferring the germinating seedlings to a wet tissue paper placed in glass petri plate, the viviparous seedlings grew faster than their normal counterparts, indicating vivipary as an adaptive reproductive strategy enabling rapid establishment of the seedlings. However, the phenomenon does not seem to be economical, as the loss of dormancy will not allow seed storage, thus reducing the viable seed yield.

1. 何謂 cryptovivipary?
2. 本試驗的植物材料中文名為何?
3. 文中 priming 意義與目的為何?
4. 試驗中那些處理可誘發 vivipary?
5. 臺灣那些重要園藝作物常見 cryptovivipary 現象?

試題隨卷繳回