

READING PASSAGE 1

You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 below.

Scented Plants

- A Many plants emit a smell. This may come from the flower of the plant, from the leaves, stem, or even, in some cases, from the root. What humans may perceive as a fragrant perfume is actually a tool used by plants to entice pollinators, discourage bacteria, or fend off predators. Fragrances consist of small organic particles with high vapor pressures, so that a scent compound evaporates easily if exposed to the air; chemicals which evaporate in this way are described as ‘volatile compounds’.
- B Although we generally think of plant odors as pleasant, many volatile compounds in plants are toxic when eaten. These compounds are used by plants to protect themselves from bacterial attack. Humans have recognized and taken advantage of these plant-derived antibacterials since antiquity, when they were used to slow the spoilage of food. For example, the spice clove could be used in baked goods and prepared meats to slow the growth of mould and bacteria, because a small amount was not dangerous to humans. Before the development of modern food preservation techniques, European civilization was heavily dependent on cloves and other tropical spices to ensure a long-lasting supply of food. However, the long distance from Europe to South-east Asia made these spices extremely expensive and was part of the motivation behind the search for a shorter route to Asia, which resulted in the discovery of the Americas.
- C Although volatile compounds in plants probably originally evolved to repel herbivorous (plant-eating) animals of all kinds, they now perform a remarkable range of functions. An important one common to many plants is to attract animals which will spread that plant’s pollen. Insects are the most common animals to interact with plants in this way, and most insects detect volatile compounds through the extremely sensitive antennae on their heads. Some antennae can detect an airborne volatile compound at concentrations of just a few parts per billion.
- D Other plants emit volatile compounds which function as toxins against invading insects, and still others emit such compounds when they have been injured, in order to deter insects from laying eggs on them and thus injuring them further. Volatile compounds released by plants in response to herbivore egg-laying, for example, can attract parasites of the eggs, thereby preventing them from hatching. In this way the plant can avoid the attack of the hungry young herbivores that would have emerged from the eggs.

- E Volatile compounds in plants can also be used as a kind of currency in some very indirect defensive systems. In the rainforest tree *Leonardoxa africana*, for example, ants of the species *Petalomyrmex phylax* are attracted to young leaves because they emit high levels of the volatile compound methyl salicylate, a substance that ants need to use as an antiseptic in their nests; coincidentally, the ants attack any herbivorous insects that they encounter. It appears that methyl salicylate both attracts ants and rewards them for performing their valuable role in deterring herbivores. The web of interactions among plants and animals can become so complicated that it is difficult to detect what the outcome of the release of volatile compounds is. But it is clear that the system can have a defensive purpose, as many experiments have shown that the deactivation of a plant's volatile emission system makes it more vulnerable to herbivores.
- F Floral scent has a strong impact on the economic success of many agricultural crops that rely on insect pollinators, including fruit trees such as the bee-pollinated cherry, apple, apricot, and peach, as well as vegetables and tropical plants such as the papaya. A decrease in fragrance emission, due to crossbreeding for fruit size or other characteristics, reduces the ability of plants to attract pollinators and may result in considerable losses for growers. This problem has been made worse in the United States by recent epidemics that have infected and killed many honeybees, the major insect pollinator.
- G Some plant breeders have tried to solve this pollination problem by spraying scent compounds on orchard trees to enhance honeybee foraging, but this approach was costly and, in the end, proved to be inefficient. One of the reasons for its ineffectiveness was that general spraying of the crop could not tell insects exactly where the blossoms were. Clearly, a more refined strategy is needed; genetic manipulation of scents, for example, would allow growers to regulate the types of insect pollinators and the frequency of their visits.
- H Such manipulation of scent will also benefit people who grow flowers commercially. Cut flowers and potted plants play an important aesthetic part in human life. Unfortunately, traditional breeding has produced varieties with improved vase life, color, and shape, while perfume has been sacrificed. The loss of scent among ornamental flowers, which have a worldwide annual value of more than US\$30 billion, makes them important targets for the genetic manipulation of flower fragrance. Some preliminary experiments have already been carried out, but for technical reasons the scent was present in every part of the plant, rather than being localized in the flower, and the level of intensity of fragrance was below the threshold of detection for the human nose. The next generation of experiments, already in progress, will include more sophisticated schemes that target the expression of scent specifically to flowers or other organs, such as special glands that can store antibacterial or herbivore-repellent compounds.

Questions 1–4

Reading Passage 1 has eight paragraphs, A–H.

Which paragraph contains the following information?

Write the correct letter, A–H, in boxes 1–4 on your answer sheet.

- 1 a list of food plants which need insects to make them productive
- 2 an explanation of why a genetic experiment may assist plant reproduction
- 3 a description of current research with advantages for the flower industry
- 4 an explanation of how insects perceive volatile compounds in plants

Questions 5–9

*Choose the correct letter, **A**, **B**, **C** or **D**.*

Write the correct letter in boxes 5–9 on your answer sheet.

5 According to the passage, spices were used in the past to

- A** keep insects away from food.
- B** improve the taste of food.
- C** prevent the decay of food.
- D** make food smell more attractive.

6 The *Leonardoa africana* tree protects itself by

- A** emitting a scent that repels plant-eating insects.
- B** attracting and poisoning herbivorous insects.
- C** chemically destroying the eggs of parasites.
- D** attracting an enemy of herbivorous insects.

7 Which of the following statements about methyl salicylate is **NOT** true according to the passage?

- A** It helps ants to protect their nests.
- B** It helps herbivorous insects to find food.
- C** It helps a rainforest tree to attract ants.
- D** It helps a rainforest tree to avoid being eaten.

8 Which factor has made the problems of US fruit growers more serious?

- A** Bees found an alternative source of food.
- B** Chemicals were killing too many bees.
- C** Fruit was decreasing in quality.
- D** Bees have had their numbers reduced by disease.

9 Experiments in genetically manipulating the fragrance of ornamental flowers have

- A** cost US\$30 billion.
- B** made the flowers more attractive to insects.
- C** failed to produce a strong enough scent.
- D** reduced production on flower farms.

Questions 10–13

Do the following statements agree with the information given in Reading Passage 1?

In boxes 10–13 on your answer sheet, write

- TRUE** if the statement agrees with the information
FALSE if the statement contradicts the information
NOT GIVEN if there is no information on this

- 10 The theory that plants defend themselves with smells is untested.
- 11 The smell from fruit-tree flowers is important to farmers.
- 12 The population of honeybees in Europe has declined.
- 13 Applying perfume to orchard trees is accepted as a good method of increasing pollination.

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一、配对题 (Q1–4)

题号	答案	题干翻译	精确定位句 (英文)	定位句翻译	详细解释
1	F	需要昆虫才能高产的食用植物清单在哪一段?	"Floral scent has a strong impact on the economic success of many agricultural crops that rely on insect pollinators, including fruit trees such as the bee-pollinated cherry, apple, apricot, and peach, as well as vegetables and tropical plants such as the papaya." (Para F)	"花香对许多依赖昆虫传粉的农作物的经济成功影响很大, 包括蜜蜂授粉的樱桃、苹果、杏、桃等果树, 以及木瓜等蔬菜与热带作物。"	题干要“清单/list”, F段给出具体作物名称并点明它们依赖昆虫传粉, 完全对应。
2	G	解释为什么基因实验可能有助于植物繁殖	"Some plant breeders... spraying scent compounds... proved to be inefficient... genetic manipulation of scents, for example, would allow growers to regulate the types of insect pollinators and the frequency of their visits." (Para G)	"一些育种者.....向果园喷香味化合物.....被证明效率低。例如, 通过对气味进行基因操控, 可以让种植者调控传粉昆虫的类型以及来访频率。"	核心是“why it may assist reproduction”, G段给出基因操控 → 可调控传粉者与来访频率 → 提升授粉/繁殖的因果解释。
3	H	对花卉产业有利的当前研究描述	"Such manipulation of scent will also benefit people who grow flowers commercially... Some preliminary experiments have already been carried out... The next generation of experiments, already in progress, will include more sophisticated schemes that target the expression of scent specifically to flowers..." (Para H)	"这种气味操控也将使商业化种花者受益.....一些初步实验已经开展.....下一代实验 (正在进行) 将采用更复杂方案, 把香味表达特异地定向到花器官....."	既明确“受益对象=花卉产业”, 又说明“目前/正在进行的研究”, 与题干完全吻合。
4	C	解释昆虫如何感知植物的挥发性化合物	"Insects... detect volatile compounds through the extremely sensitive antennae on their heads. Some antennae can detect an airborne volatile compound at concentrations of just a few parts per billion." (Para C)	"昆虫通过头部极其敏感的触角来检测挥发性化合物。有些触角甚至能在十亿分之几的浓度下检测到空气中的挥发性化合物。"	C段给出感知器官(触角)与灵敏度(ppb级), 正是“how insects perceive”。

二、单选题 (Q5–9)

题号	答案	题干翻译	精确定位句 (英文)	定位句翻译	详细解释
5	C	根据文章, 以前香料被用来做什么?	"Humans... used [these plant-derived antibacterials] to slow the spoilage of food." (Para B)	"人类.....用它们来减缓食物变质。"	"prevent the decay of food (防止腐败)" 与 "slow the spoilage" 同义改写, 故选 C。A/D 未提, B (改善味道) 不是本文主旨。
6	D	<i>Leonardoxa africana</i> 如何保护自己?	"Ants... are attracted...; coincidentally, the ants attack any herbivorous insects they encounter." (Para E)	"蚂蚁被吸引来.....并顺带攻击所遇到的食草性昆虫。"	树通过气味吸引蚂蚁 (捕食者/天敌), 从而间接防御; 对应选项 D “吸引食草昆虫的敌人”。A/B/C 与文意不符。
7	B	关于水杨酸甲酯, 哪项不正确?	"a substance that ants need to use as an antiseptic in their nests... methyl salicylate both attracts ants and rewards them... valuable role in deterring herbivores." (Para E)	"蚂蚁在巢中作为防腐剂所需的物质.....水杨酸甲酯既吸引又奖励蚂蚁.....在吓退食草者方面发挥作用。"	文中只提对蚂蚁/树有利, 没有“帮助食草昆虫找食物”的信息, 故 B (NOT true)。A/C/D 都被文本明确支持。
8	D	使美国果农问题更严重的因素是?	"This problem has been made worse in the United States by recent epidemics that have infected and killed many honeybees, the major insect pollinator." (Para F)	"在美国, 这一问题因近期流行病而恶化, 这些疾病感染并杀死了大量蜜蜂——主要的传粉昆虫。"	选项 D “蜜蜂因疾病数量减少”是原句同义表达。A/B/C 均未见或不符。
9	C	关于花香基因操控实验, 结果如何?	"for technical reasons... the level of intensity of fragrance was below the threshold of detection for the human nose." (Para H)	"出于技术原因.....香味强度低于人鼻可检测阈值。"	即“香味不够强”, 与选项 C “未能产生足够强的气味”一致; A 把 300 亿美元 (行业年产值) 误作成本; B/D 文中未述。

三、判断题 (Q10–13)

题号	答案	题干翻译	精确定位句 (英文)	定位句翻译	详细解释
10	FALSE	“植物用气味自卫”的理论尚未得到检验。	“many experiments have shown that the deactivation of a plant's volatile emission system makes it more vulnerable to herbivores.” (Para E)	“许多实验表明，一旦关闭植物的挥发物释放系统，就会更容易受食草动物危害。”	文中说“许多实验已证明”，与“尚未检验 (untested)”相反，因此为 FALSE。
11	TRUE	果树花朵的气味对农民很重要。	“Floral scent has a strong impact on the economic success of many agricultural crops that rely on insect pollinators, including fruit trees ...” (Para F)	“花香对依赖昆虫传粉的许多农作物（包括果树）的经济成功有重要影响。”	“经济成功”= 对农民/种植者的重要性，故 TRUE。
12	NOT GIVEN	欧洲的蜜蜂数量已经下降，	文中仅有：“...in the United States... epidemics... killed many honeybees ...” (Para F)	“仅提到美国蜜蜂受疾病影响。”	地域限定为美国，对欧洲没有信息，因此 NOT GIVEN。
13	FALSE	给果园树喷香水被普遍认为是增加授粉的好方法。	“spraying scent compounds... was costly and proved to be inefficient.” (Para G)	“向果园喷香味化合物.....成本高且被证明效率低下。”	被证实效率低，并非“好方法/被接受”，所以 FALSE。