

农科专业 英语

(农学分册)

农科专业英语编写组 编

四川科学技术出版社
English

English

SELECTED
READINGS
IN ENGLISH
FOR
STUDENTS
OF
AGRICULTURE

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前 言

编写本书的目的，是想为农业院校学习了基础英语的学生，提供一套后续教材或作他们自学之用，从而逐渐把阅读科普英语的能力，过渡到阅读专业英语的能力上来。

本书分农学和畜牧兽医两分册，各14课，每课包括课文和阅读材料两部分，附有词汇表及疑难句注释。每一课文后设计了一些练习，供读者选作。课文及阅读材料均选自国外近期出版的农业书刊。知识性较强，还有一定的实用价值。

本书在付印前承四川建材学院周纪兴老师及该校英籍英语教师维多利亚小姐 (Miss Victoria Price) 对练习进行了审阅，提了许多宝贵的意见，对其热情支持谨此表示衷心感谢。另在本书的编审过程中，李超和何姝同志协助做了许多工作，在此一并致谢。

最后，希望使用本书的读者，对本书的缺点与错误不吝指正。

编 者

1988年7月1日

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Lesson One

Text

Photosynthesis

Animals and green plants need a supply of raw materials and a source of energy to synthesise the many complex organic substances from which protoplasm is made. Animals get their energy from organic substances in their diets. Green plants obtain their energy from sunlight. The process whereby green plants use sunlight to produce organic molecules is called photosynthesis. Carbon dioxide and water are the raw ingredients for the process, which can be summarised simply in the following equation:



Photosynthesis is of the greatest importance to all living organisms. The organic substances made in photosynthesis can later be used by animals and other non-photosynthetic organisms. Thus in all ecosystems green plants are the producers on which the consumer organisms depend for energy and raw ingredients. On a global scale carbon dioxide is used in photosynthesis at a rate which more or less balances its output from respiration and the burning of fossil fuels such as coal and oil. What is more, the release into the environment of oxygen made in photosynthesis compensates for the uptake of oxygen by living organisms for respiration. Photosynthesis therefore helps to maintain an equilibrium or steady state in the environment.

The main organs of photosynthesis in terrestrial plants are the leaves. It is in the leaves that chloroplasts are present in abundance. If they are to function efficiently chloroplasts must have an adequate supply of water and carbon dioxide. They must also receive light of suitable wavelength and intensity. The structure of the leaves of mesophytes enables the photosynthetic requirements to reach the chloroplasts efficiently.

The leaves of mesophytic plants are broad, thin, flattened structures. They thus have a relatively large surface area through which light can pass. The thinness of leaves means that light reaching the leaf surface has to pass only a short distance before reaching the mesophyll tissue where the chloroplasts are mainly located. Penetration of light to the mesophyll tissue is helped by the transparency of the leaf epidermis.

The leaves of many plants grow so that the leaf blade is usually at 90° to the sun's rays. Shading by leaves on the same shoot is often avoided because the leaves are normally arranged in a mosaic. These adaptations help to ensure that the maximum amount of available sunlight is received by each unit area of leaf surface. Leaves which are shaded have a larger surface area than those exposed to full sunlight. Shade leaves (those which are shaded) are also thinner and have more chloroplasts. Because of this shade leaves make efficient use of the dim light they receive.

Inside chloroplasts the photosynthetic pigments are spread out in thin layers. This arrangement presents a relatively extensive surface area for the absorption of sunlight. Chloroplasts can also change their positions to make the best use of available light.

Water is carried into a leaf through a main vein in the midrib. An extensive network of minor veins arising from the main vein penetrates the mesophyll tissue. In an oak leaf, for example, each mm² of leaf area contains a total length of about 10 mm of vein. Under normal circumstances the xylem elements of the veins maintain a continuous flow of water to the leaf tissues. Another important function of the leaf veins is to carry away the organic products of photosynthesis to other parts of the plant. Phloem elements in the veins are responsible for this task.

The waxy cuticle covering the epidermis of leaves is permeable to carbon dioxide in some plants. In other species carbon dioxide reaches the mesophyll tissue mainly through the stomata. There are three main patterns of stomatal distribution in leaves. In many mesophytic plants stomata are confined to the lower epidermis. The leaves of some mesophytes have a few stomata on the upper epidermis. Equal numbers of stomata occur on both surfaces in many monocotyledonous species. Each stoma consists of a pair of guard cells between which a pore is formed when the stoma is open. The walls of the guard cells are unevenly thickened. The inner walls where the two cells face each other is much thicker than the outer walls. The guard cells are nucleate and several small chloroplasts are often present in the dense cytoplasm.

The stomata of most terrestrial plants open in light and close in darkness. Water loss due to transpiration is thus confined to periods when the plant is obtaining carbon dioxide from the surrounding air. Conservation of water is essential in a terrestrial environment because of the dehydrating effect of the atmosphere. Some xerophytic plants open their stomata only at night when the drying power of the air is less intense.

Changes in turgidity of the guard cells are responsible for the opening and closing of stomatal pores. When the guard cells are turgid the pores are open. The guard cells of closed stomata are flaccid. Stomata close in wilted plants because the guard cells lose turgidity following excessive water loss by evaporation. The reasons for changes in the turgidity of guard cells of non-wilted plants, however, are still a matter for debate. The factors which are thought to be mainly responsible include photosynthesis by the guard cells, carbon dioxide concentration of the air inside leaves and the concentration of mineral ions in the guard cells.

— Abridged from *Advanced Biology* by J. Simpkins and J. I. Williams, Bell & Hyman Limited, London, 1984.

Words and Expressions

compensate	['kɒmpenseɪt]	vi.	补偿
cuticle	['kju:tɪkl]	n.	表皮; 角质层
dehydrate	ˌdi:'haɪdreɪt]	v.	脱水
ecosystem	ˌi:kə'sɪstəm]	n.	生态系 (统)
epidermis	ˌepɪ'de:mɪs]	n.	外皮; 表皮 (层)
equilibrium	ˌi:kwi'libriəm]	n.	平衡
evaporation	ˌi,væpə'reɪʃən]	n.	蒸发 (作用)
flaccid	['flæksɪd]	a.	松弛的
ingredient	ˌɪn'ɡri:djənt]	n.	成分, 配料
mesophyll	['mesəfil]	n.	叶肉
mesophyte	['mesəfaɪt]	n.	中生植物
mesophytic	ˌmesə'fɪtɪk]	a.	中生植物的
midrib	['mɪdrib]	n.	中脉 (指叶)
monocotyledonous	ˌ'mɒnəu,kɒtɪ'li:dənəs]	a.	单子叶植物的
mosaic	[mə'zeɪɪk]	n.	嵌合体, 镶嵌性
nucleate	['nju:kli:t]	a.	有核的
permeable	['pɜ:mjəbl]	a.	可渗透的
photosynthesis	ˌfəʊtəʊ'sɪnθə'sɪs]	n.	光合作用
phloem	['fləʊem]	n.	韧皮部
pigment	['pɪɡmənt]	n.	色素
terrestrial	[tɪ'restriəl]	a.	陆生的
transparency	[træns'peərənsɪ]	n.	透明性
transpiration	ˌtrænspi'reɪʃən]	n.	蒸腾作用
turgid	['tɜ:ʒɪd]	a.	膨胀的
turgidity	[tɜ:'ʒɪdɪti]	n.	肿胀

waxy	['wæksi]	a.	蜡状的, 蜡质的
whereby	[wɛə'baɪ]	ad.	靠那个
xerophytic	[,ziərə'fɪtɪk]	n.	旱生植物的
xylem	['zaɪləm]	n.	木质部
fossil fuels	矿物燃料		
guard cells	保卫细胞		

Notes to the Text

1. Animals and green plants need a supply of raw materials and a source of energy to synthesise the many complex organic substances from which protoplasm is made.

动物和绿色植物需要供以原料和能源, 以合成能产生原生质的许多复合有机物质。

不定式词组 "to synthesise the many complex organic substances from which protoplasm is made" 在句中作状语, 其中 "from which protoplasm is made" 是定语从句, 修饰 "substances"。

2. On a globe scale carbon dioxide is used in photosynthesis at a rate which more or less balances its output from respiration and the burning of fossil fuels such as coal and oil.

在全球范围内, 二氧化碳在光合作用中的使用率多少平衡了因呼吸, 以及象煤和石油这类矿物燃料燃烧而产生的二氧化碳输出量。

句中 "balance" 是及物动词, 意为 "使平衡, 使力量均等"。如:

The acrobat balanced himself on the high rope.

Income and expenditures exactly balance.

Exercises

1. The following statements are about the text.

Decide whether they are true or false.

- Green plants get their energy from fossil fuels.
- Photosynthesis often breaks up the state of balance in the environment.
- The main organs involved in photosynthesis are leaves and stems.
- To get the maximum sunlight, the leaves are often arranged at right angles to the rays.
- The structure of the leaves of many plants enables sunlight, water and carbon dioxide to reach the chloroplasts efficiently.

- I. Choose the right word or phrase from the list given below for each blank.

occur	enable
flow	make use of
exposed	distribution
arise from	depending on
maintain an equilibrium	be responsible for

1. The word "class" can be singular or plural, _____ whether you think of it as a body or as a group of people.
2. Those plants not _____ to the sunlight will soon die.
3. We know the process whereby green plants _____ sunlight to produce organic molecules is called photosynthesis.
4. The _____ of the River Nile is at its fastest in the late summer.
5. Photosynthesis can _____ in the environment by compensating for the uptake of oxygen by living organism for respiration.
6. Difficulties in carrying away waste products _____ lack of vehicles.
7. The _____ of chloroplasts varies from plant to plant.
8. The important function of the leaf veins _____ carrying away the organic products of photosynthesis to other parts of the plants.
9. The waxy cuticles covering the epidermis of leaves in some plants _____ the mesophyll tissue to get CO₂.
10. That sound doesn't _____ in his language so it is difficult for him to pronounce.

III. Match the following antonyms (opposite words):

- | | |
|-----------|--------------|
| 1. inner | a. outside |
| 2. turgid | b. closed |
| 3. dim | c. nonwilted |
| 4. inside | d. outer |
| 5. wilted | e. bright |
| 6. open | f. flaccid |

IV. In each case, choose one of the four words that best matches the definition given below.

1. to remove all the water from

a) to compensate	b) to absorb
c) to dehydrate	d) to release
2. able to be got, obtained, used, etc.

a) available	b) acceptable
c) admissible	d) achieved
3. the quality of being intense

a) quality	b) intensity
c) intention	d) intent
4. a new growth from a part of a plant, esp. a young stem and leaves

a) shade	b) layer	c) vein	d) shoot
----------	----------	---------	----------
5. of or related to the earth

a) territorial	b) tertiary
c) terrestrial	d) xerophytic

V. Translate the following sentences into Chinese, paying attention to the words in capitals.

1. The process **WHEREBY** green plants use sunlight to produce organic molecules

is called photosynthesis.

2. He worked out a plan *WHEREBY* he might succeed in making efficient use of the short frostless season.
3. *WHAT IS MORE*, the release into the environment of oxygen made in photosynthesis compensates for the uptake of oxygen by living organisms for respiration.
4. If they *ARE TO* function efficiently chloroplasts must have an adequate supply of water and carbon dioxide.
5. Two of the important functions of the root *ARE TO* anchor the plant in place and absorb water and minerals.
6. Each stoma consists of two cells *BETWEEN WHICH* there is a very small opening *THROUGH WHICH* air passes.
7. The transparency of the leaf epidermis helps sunlight to come to the mesophyll tissue *WHERE* the chloroplasts are mainly located.

V. Translate the following into Chinese,

1. Photosynthesis by the Guard Cells

The earliest theories state that the formation of sugars by photosynthesis in the guard cells is the key factor causing stomata to open. The water-soluble sugars lower the water potential of the guard cells causing water to enter by osmosis from surrounding epidermal cells. When exposed to light therefore the guard cells gradually increase in turgidity and the stomata open. However, not all guard cells contain chloroplasts. Think of those on the non-green parts of variegated leaves. Even guard cells with chloroplasts are unlikely to make sugars quickly enough to bring about the rapid increase in pressure potential necessary for opening stomata.

2. Carbon Dioxide Concentration inside Leaves Guard cells are sensitive to changes in the concentration of carbon dioxide in the air around them. High concentrations of carbon dioxide cause stomata to close, low concentrations cause them to open. What is more, there are fluctuations in the concentration of carbon dioxide in and around leaves each day. In darkness, when photosynthesis stops, respiratory carbon dioxide accumulates. During the daytime, however, carbon dioxide is used for photosynthesis. The concentration of carbon dioxide inside the leaf is then much lower than at night. But how can changes in carbon dioxide concentration bring about changes in turgidity of the guard cells? After a period of darkness most guard cells contain starch grains which are changed to sugar on exposure to light. Could it be that the conversion of starch to sugar is affected by carbon dioxide concentration, and if so how?

Lesson Two

Text

Grid Matching, A New Method for Homoclimate Analysis

INTRODUCTION

At least half of the timber cut in the world is used for fuel and many countries are now seriously short of fuelwood. Already *Eucalyptus* species play a major role in meeting the timber and fuelwood needs of many countries, but other Australian genera, in particular *Acacia* and *Casuarina*, have great potential for fuelwood production. A large number of these species have not been evaluated as fuelwood sources outside Australia; the Australian Centre for International Agricultural Research (ACIAR) is therefore supporting a research program to identify promising species and define environments to which they are suited.

As part of this program, Booth has described how the Bioclimate Prediction System (BIOCLIM) devised by Nix, Busby and Hutchinson (unpublished) can assist species selection by identifying homoclimates. BIOCLIM requires geocoded (latitude, longitude, elevation) specimen or observation data as input and estimates a set of climatic attributes for each point, derives a bioclimatic envelope or template and generates maps of predicted potential distributions on a grid at some specified level of resolution. Using BIOCLIM, Booth estimated the natural bioclimatic envelope of *Eucalyptus citriodora*, identified sites in Africa which satisfied these criteria and compared these locations with the distribution of sites where *E. citriodora* had been successfully introduced.

An alternative, long-established method of homoclimate analysis for forestry is to match climatic attributes of the target location, where a species or provenance trial is to be established, with regions from which trees are to be introduced. Qualitative assessments, standard classifications, and quantitative measurements have all been used to assist matching. Studies in Australia have used these methods to assist the introduction of native species overseas. Areas have been identified for seed collection and samples from the Tree Seed Centre at the CSIRO Division of Forest Research have been selected for trials.

The need for climatic data specifically for forestry purposes has led to the preparation of two editions of a *Summary of Meteorological Data in Australia*, the latter volume contains information for 506 climate stations. Unfortunately for homoclimate studies, these climate stations are mostly located in areas of human settlement and the network is very sparse and uneven in mountainous and hilly areas.

The grid matching method is designed to overcome this limitation and to provide a routine basis for homoclimate analysis. The aim is to identify areas in which species and provenances worthy of trial are likely to be found. The method does not attempt to predict actual performance, it uses simple longterm mean climatic data from a target location which are compared with sites in a regular grid, and the sites which are most climatically similar are identified. Australia is used here as the grid example, but the technique could be applied anywhere, provided that long-term climatic records are available.

METHOD

Climatic indices

The first stage of the grid matching procedure is to select a location for analysis. The location can be any site for which monthly mean values of daily maximum temperature, daily minimum temperature and precipitation are available or can be estimated. From these 36 attributes 18 indices are calculated which summarize the variation in mean climatic conditions. The indices, which are measured in °C, mm or dimensionless units, are as follows:

1. Annual mean temperature
2. Coldest month minimum temperature
3. Hottest month maximum temperature
4. Annual temperature range
5. Wettest quarter mean temperature
6. Driest quarter mean temperature
7. Annual mean precipitation
8. Wettest month mean precipitation
9. Driest month mean precipitation
10. Annual precipitation range
11. Wettest quarter mean precipitation
12. Driest quarter mean precipitation

13. Warmest quarter mean precipitation
14. Coldest quarter mean precipitation
15. Warmest quarter mean temperature
16. Coldest quarter mean temperature
17. Annual precipitation range/(annual mean precip/12)
18. Annual temperature range/annual mean temperature

Initially, just the first 12 indices shown above were used, but additional variables were found to be necessary to increase the emphasis on temperature and precipitation seasonality. The 18 indices for the 'target' location are compared with the same types of measurements made within an area of interest.

In this case, bioclimate indices were estimated for 2795 points across Australia using recently developed interpolation techniques. These allowed estimates of mean climatic conditions to be made for any site from its latitude, longitude and elevation with acceptable levels of accuracy. For example, the mean errors for the continental surfaces used to estimate mean minimum and maximum temperatures were 4.1 and 1.3% respectively. For the 19 regional precipitation surfaces mean monthly errors were usually below 10%.

— Adapted from *AGRICULTURAL AND FOREST METEOROLOGY*
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Words and Expressions

Acacia	[ə'keɪʃə]	n.	金合欢属植物；刺槐；洋槐
alternative	[ɔ:l'tə:nətɪv]	a.	随便一个的，二中择一的
assessments	[ə'sesmənts]	n.	估价，评价
attribute	['ætrɪbjʊt]	n.	特征，属性，品质
brake	[breɪk]	n.	制动器；闸；刹车
citriodora	[,sɪtri'əʊdəərə]	a.	柠檬气味的
data	['deɪtə]	n.	(datum 的复数)数据，记录；数据处理
denude	[di'nju:d]	vt.	滥伐…树木
derive	[di'raɪv]	vt.	得到，导出；vi 派生出来
dilemma	[dai'lemə]	n.	窘境；进退两难的选择方式或境地
dimensionless	[dai'mensənɪs]	a.	无量纲的
elevation	[,eli'veɪʃən]	n.	海拔（高度）
envelope	['envɪləʊp]	n.	模型
fuelwood	['fjuəlwud]	n.	木柴
genera	['dʒenərə]	n.	(genus 的复数)类，种类；[生] 属
geocoded	[,dʒiəʊ'kəʊdɪd]		(latitude, longitude, elevation) 地

grid	[grid]	<i>n.</i>	方格; 座标
homoclimate	[ˈhəʊməʊklaɪm]	<i>n.</i>	相同气候
identify	[aɪˈdentɪfaɪ]	<i>vt.</i>	鉴别, 辨认, 识别: 使等同于
indices	[ˈɪndɪsɪːz]		(index 的复数) 指标; 索引
illustrate	[ˈɪləstreɪt]	<i>vt.</i>	图解: 用图说明
initially	[ɪˈnɪʃəli]	<i>ad.</i>	最初, 开始
interpolation	[ɪntəːpəʊˈleɪʃən]	<i>n.</i>	内插法, 插值法
location	[ləʊˈkeɪʃən]	<i>n.</i>	位置, 场所, 地点
match	[mætʃ]	<i>vi.</i>	相称, 相适合, 相配
meteo	[ˈmiːtiərə]	<i>n.</i>	气象
precipitation	[prɪsɪpɪˈteɪʃən]	<i>n.</i>	降水(量), 降雨量
procedure	[prəˈsiːdʒə]	<i>n.</i>	程序; 过程; 步骤
provenance	[ˈprɒvɪnəns]	<i>n.</i>	种苗原产地; 起源; 出处
range	[reɪndʒ]	<i>n.</i>	分布区
respectively	[rɪsˈpektɪvli]	<i>ad.</i>	分别地, 各自地, 相应各为
routine	[ruːˈtiːn]	<i>a.</i>	常规的, 日常的, 例行的
seasonality	[ˌsiːzˈnælɪti]	<i>n.</i>	季节性
settlement	[ˈsetlmənt]	<i>n.</i>	解决
sparse	[spɑːs]	<i>a.</i>	稀疏
specifically	[spiˈsɪfɪkəli]	<i>ad.</i>	特别地, 明确地, 按特性
template = templet	[ˈtemplɪt]	<i>n.</i>	样板, 标准框
variable	[ˈveəriəbl]	<i>a.</i>	可变的
variation	[væəriˈeɪʃən]	<i>n.</i>	变化, 变动
Bioclimate Prediction System			生物气候预测系统
CSIRO (C.S.I.R.O) 全名为: Commonwealth Scientific and Industrial Research Organization			联邦科学和工业研究机构 (澳大利亚)
Division of Forest Research			森林研究司
division	[dɪˈvɪʒən]	<i>n.</i>	(政府机构等的) 司, 科

Notes to the Text

1. An alternative, long-established method of homoclimate analysis for forestry is to match climatic attributes of the target location, where a species or provenance trial is to be established, with regions from which trees are to be introduced

另一个早已建立的林学相同气候分析方法, 是使目标位置的气候特征和计划中树种来源的地区相称, 这个目标位置是计划进行某种树种或种源试验的地方。

在本句中 are to be introduced 都是“要”、“计划”之意。如:

The weather is to be foretold at eight o'clock tonight. The climatic indices are to be measured off tomorrow morning.

Where a species or provenance trial is to be established 是一非限定性定语从句。

... from which trees are to be introduced 是一限定性定语从句, 其先行词是 regions,