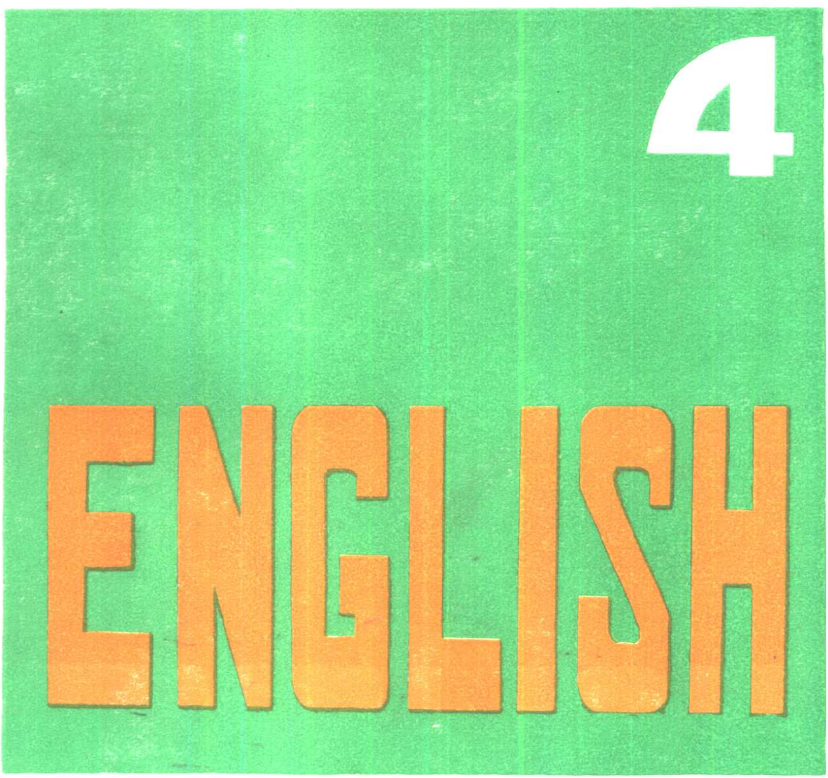
第二外语课教材

英语

北京外国语学院英语系编



外语教学与研究出版社

第二外语课教材

英　语

（第四册）

北京外国語学院英語系編

外語教学与研究出版社

第二外语课教材
英語　（第四册）
北京外国语学院英语系编

外语教学与研究出版社出版
（北京外国语学院23号信箱）
北京外国语学院印刷厂排版
北京怀柔平义分印刷厂印刷
新华书店北京发行所发行
全国各地新华书店经售
开本 787×1092　1/32　8印张　128千字
1985年12月第1版　1985年12月北京第一次印刷
印数　1 — 21,000册

书号：7215·97　　定价：1.35元

CONTENTS

Lesson Fifty-four

Nuclear Physics and Agriculture

World agriculture today presents a strange picture. The world population it has to feed is increasing at an alarming rate, and more than half its present numbers are under-nourished. In the countries of high productivity and relatively low population density, there are embarrassing surpluses. In those with low productivity and high population densities, there is acute shortage, and by and large these countries do not have the funds to buy what is in excess elsewhere. They can get part of what they need only as generous gifts of surpluses. Clearly, the first task is to try to raise the standard of farming in these hungry countries, by applying the techniques which have already been proven elsewhere. But, while this might meet the needs of the world population today, in the years it will take to achieve such an end the number of mouths to be fed will have jumped still further ahead. Until the growth in population can be checked, agriculture will always be chasing a receding objective.

It will be necessary to bear on this problem all the knowledge and every technique available to the scientist.

The last great leap forward in productivity, based on the scientific advances of the first half of the twentieth century, has now reached a plateau beyond which the best farmers can go little further.

Before agriculture can become more productive, it must await the applications of the findings of a new field of science which will open up entirely new approaches to the old problems which have so far proved insoluble. Nuclear physics and its many applications in chemistry and biology provides just such an opening. It is too early yet to do more than to speculate on the ultimate effect on food production of investigations in which radioactive substances are employed, but some examples will illustrate the great potential influence of this work.

One of the unsolved problems of fertilizer practice is the behaviour of phosphates in the soil. When phosphatic fertilizers are added to soil, they react with other soil constituents and in part are rendered unavailable to the plant. Each year the farmer adds fresh fertilizer so that it is available for his crop, and each year part of this disappears into the soil complex; but it is not entirely lost to the plant. When a sufficient reserve of unavailable phosphate has been built up, the process can be reversed, if the level of available phosphate falls. Thus, Dutch farmers found during the war, when no phosphatic fertilizers were available, that they had

sufficient reserve in the soil from past application to meet the requirements of their crops without any drop in yield. It is obviously of great importance to the farmer to know more about the behaviour of phosphates in the soil, if this means that he can omit their use in some years.

The study of this problem has been limited in the past by the scientist's inability to follow the fate of added phosphorus. The use of the radioactive isotope P^{32} has opened up new lines of investigation. Not only is it possible to follow experimentally the fate of added phosphate in contact with different soils but also, by feeding radioactive phosphate to soil and following its absorption by the plant, the relative proportions of the total phosphate uptake coming from the added material and from the fixed phosphate in the soil can be determined.

Another problem of great importance to the farmer is the crop density which gives him the maximum yield. If the spacings are too close, the plants interfere with each other and growth is hindered; if they are too far apart, land and fertilizer are wasted. Scientists have been studying root development for many years, but with limited success. Any experiments involved either digging up the plants in order to examine the roots or artificial conditions such as boxes with glass sides through which a section of the roots of the plant could be

seen.

A simple solution to this problem is again provided by the use of P^{31}. A solution of phosphate containing P^{32} is placed in the soil at different distances from the plant and at different depths below it. As soon as a root meets this radioactive material, it can be detected in the growing tips of the plant. By placing the radioactive material in different positions for successive plants, it is possible to form a good picture of the root development.

The solution of many problems complementary to those of plant nutrition, namely those connected with plant protection, can be found in the use of radioactive tracers.

It is often difficult to follow the movements of small winged insects and to study their feeding habits. Where these insects are the vectors carrying disease, it is of the greatest importance to know how far and in what way they travel. If they are allowed to feed on a plant which has been labelled with P^{32}, it is comparatively easy to follow without the use of radioactive tracers, but a few microcuries of a gamma-emittint isotope attached to the body of a wire-worm will enable its movements to be traced easily and plans can then be laid for its destruction.

Radioactive sources, too, have their place in plant breeding, although here the early promise has not been

entirely fulfilled. When seeds or growing buds are exposed to nuclear radiations, mutations occur. Many of these mutants have been so changed that they will not survive, but among those that do there may be found desirable characteristics which can be introduced by breeding into commercial varieties. Mass irradiation was tried by the use of a powerful cobalt-60 source in a field where the various crops could be grown at suitable distances. However, this method requires elaborate equipment and organization and is apt to produce, when the seeds are grown on, an embarrassing number of mutations, which present enormous problems to the plant breeder. It is very rare that a mutant retains the good qualities of the parent strain with an added desirable character. Almost always the desirable character is associated with undesirable variations, and hence a long breeding programme is involved in fixing the new character in a variety which also has all the good qualities of the old. Most plant breeders are content to use irradiation at relatively low levels and on a small scale. Seeds or pollen grains are exposed to a modest source of a few curies in a rotating container. Such a technique yields no more mutants than can be easily handled.

New Words and Expressions

undernourished [ˈʌndə ˈnʌriʃt] adj. 营养不足的
productivity [ˌprɔdʌkˈtiviti] n. 生产率

embarrassing 〔im'bærəsiŋ〕 adj.	令人为难的
acute 〔ə'kju:t〕 adj.	严重的，尖锐的
shortage 〔'ʃɔ:tidʒ〕 n.	不足
by and large	总的说来
excess 〔ik'ses〕 n.	过剩
generous 〔'dʒenərəs〕 adj.	慷慨的
recede 〔ri'si:d〕 vi.	退远
objective 〔ɔb'dʒektiv〕 n.	目标
insoluble 〔in'sɔljubl〕 adj.	不能解决的
speculate 〔'spekjuleit〕 vi.	推测，思索
radioactive adj.	放射性的
illustrate 〔'iləstreit〕 v.	说明
potential 〔pə'tenʃəl〕 adj.	潜在的
phosphate 〔'fɔsfeit〕 n.	磷酸盐
react vi.	起化学反应
constituent 〔kən'stitjuənt〕 n.	成份，要素
render vt.	使变为
reverse vt.	使倒转
requirement 〔ri'kwaiəmənt〕 n.	需要，要求
phosphorus 〔'fɔsfərəs〕 n.	磷
isotope 〔'aisəutəup〕 n.	同位素
absorption n.	吸收
relative 〔'relətiv〕 adj.	相对的，相关的
proportion n.	比例
total 〔'təutl〕 n.	总量
spacing n.	间隔
interfere 〔ˌintə'fiə〕 vi.	干扰

hinder vt. 阻碍，阻挠
section n. 部份
solution [sə'lu:ʃən] n. 溶液
detect [di'tekt] vt. 探测，觉察
complementary [ˌkɔmpli'mentəri] adj. 互为补充的
nutrition n. 营养
tracer n. 扫描
vector ['vektə] n. 传病媒介
distance n. 距离
burrow ['bʌrəu] vi. 钻洞躲藏
nematode ['nemətəud] n. 线虫
wire-worm n. 切根虫（害虫）
destruction n. 毁灭，破坏
breed vi. 繁殖，育种
radiation [ˌreidi'eiʃən] n. 辐射
irradiation [iˌreidi'eiʃən] n. 辐照
elaborate [i'læbərit] adj. 复杂的
equipment [i'kwipmənt] n. 设备
apt adj. 易于，倾向于
retain [ri'tein] vt. 保留
parent strain 亲本，母系
associate [ə'səuʃieit] vt. 使发生联系
variation [ˌvɛəri'eiʃən] n. 变异，变种
hence adv. 因此，由此
content [kən'tent] adj. 满意的
pollen ['polin] n. 花粉
rotate [rəu'teit] vi. 旋转

container [kən'teinə] n. 容器

Notes to the Text

1. embarrassing surpluses — People in these countries have so much food that they are even uncertain what to do with it, while there are shortages in many other countries. This gives them a feeling of discomfort.
2. reached a plateau — Agricultural productivity has now come to a period characterized by relative absence of progress.
3. the process can be reversed — When the farmer doesn't add fresh fertilizer, the level of available phosphate falls. Then the reserve of phosphate in the soil from past application will become available to the plant.
4. radioactive isotope (放射性同位素)— Isotope (同位素) means two or more forms of chemical elements which have the same properties (性能) but have different numbers of neutrons (中子) in the nucleus.
5. microcurie — a very small unit in measuring radioactivity. Curie is named after the discoverers of radium.
6. a gamma-emitting isotope — an isotope which gives off gamma rays, one of the three kinds of rays sent out by radioactive substances.
7. mutation (突变，变种) — a sudden (not gradual)

variation in some inheritable characteristics of an animal or plant.

mutant (突变体) — an animal or plant with inheritable characteristics which are different from those of the parents.

8. cobalt (钴) —a hard, steel-grey metallic chemical element.

cobalt-60 — the radioactive isotope of cobalt.

Word Study

limit

1. v. — to restrict

We must limit our spending as much as possible.

They decided to limit the discussion to one hour and a half.

2. n. — the furthest extent or amount

It is said people going abroad to study are chosen within the age limit of 35.

There was no limit to the number of students at our night school.

My best wishes for you and your family have no time limit.

3. adj. limited

His experience is very much limited.

The membership of the club, limited to 30 at present, will increase to 100 next year.

present

1. v. — to show; to offer; to give as a gift

   As soon as they entered the small, dark church, a sad picture was presented to their sight.

   Language study presents no difficulty to little children.

   A group of young girls came up to present them with flowers.

2. adj. — being in the place; occurring or existing at this time

   How many people were present at yesterday's meeting?

   At the present time, very few people would care to read a novel like this.

3. n. — this time; a gift

   My parents are at present in Canada.

   The camera was given to him as a birthday present.

   The students exchanged presents at the New Year party.

check

1. v. — to stop; to hold back; to examine

   The natural growth of population in China has been successfully checked in the past few years.

   Check your papers before you hand them in to the teacher.

2. v. — to place something somewhere to be looked after

The train will leave in 30 minutes. Have you checked your baggage?

They checked their coats and hats before they went into the hall.

3. n. = cheque — an order for claiming money from a bank

It is not necessary to pay us in cash. You can pay by check.

My mother sent me a check for 30 dollars.

provide v. — to supply something needed

The trees along the road provide shade in summer.

That small restaurant provides good meals.

They promised to provide these young people with work and wages.

The foreign guests were provided with a special plane.

Sidney Harvey has to work hard to provide food and clothes for his sick wife and children.

The five orphans have been very well provided for under the care of the People's Government.

expose v. — to uncover; to make known

We are determined to expose those criminals at the next meeting.

To make progress, you should expose your mistakes of the past and correct them.

She is afraid that her secret will be exposed sooner or later.

It is better to keep the medicine in the dark. It mustn't be exposed to the sunlight.

Exercises

1. Tell which of the following statements is true and which is false according to the text:

1) Not more than half the world population is underfed.
2) Countries with high population densities tend to have food surpluses.
3) Raising the standard of farming in these hungry countries by applying new techniques will solve their food problems.
4) Agriculture today has reached a stage in which productivity increase is very slow.
5) It is now possible to make agriculture much more productive.
6) Phosphatic fertilizer which is not used up by the crop and remains in the soil is lost for future crops.
7) Farmers could omit the use of phosphatic fertilizers in some years if they understood how these fertilizers behave.
8) The P^{32} isotope is used to trace root development by placing the solution of phosphate in various parts of the roots.
9) If insects feed on a plant which contains P^{32}, it is easy to follow their movements.