tpo_38_passage_3

Genes from virtually any organism, from viruses to humans, can now be inserted into plants, creating what are known as transgenic plants. Now used in agriculture, there are approximately 109 million acres of transgenic crops grown worldwide, 68 percent of which are in the United States. The most common transgenic crops are soybeans, corn, cotton, and canola. Most often, these plants either contain a gene making them resistant to the herbicide glyphosate or they contain an insect-resistant gene that produces a protein called Bt toxin. On the positive side, proponents of transgenic crops argue that these crops are environmentally friendly because they allow farmers to use fewer and less noxious chemicals for crop production. For example, a 21 percent reduction in the use of insecticide has been reported on Bt cotton (transgenic cotton that produces Bt toxin). In addition, when glyphosate is used to control weeds, other, more persistent herbicides do not need to be applied. On the negative side, opponents of transgenic crops suggest that there are many questions that need to be answered before transgenic crops are grown on a large scale. One question deals with the effects that Bt plants have on nontarget organisms such as beneficial insects, worms, and birds that consume the genetically engineered crop. For example, monarch caterpillars feeding on milkweed plants near Bt cornfields will eat some corn pollen that has fallen on the milkweed leaves. Laboratory studies indicate that caterpillars can die from eating Bt pollen. However, field tests indicate that Bt corn is not likely to harm monarchs. Furthermore, the application of pesticides (the alternative to growing Bt plants) has been demonstrated to cause widespread harm to nontarget insects. Another unanswered question is whether herbicide-resistant genes will move into the populations of weeds. Crop plants are sometimes grown in areas where weedy relatives also live. If the crop plants hybridize and reproduce with weedy relatives, then this herbicide-resistant gene will be perpetuated in the offspring. In this way, the resistant gene can make its way into the weed population. If this happens, a farmer can no longer use glyphosate, for example, to kill those weeds. This scenario is not likely to occur in many instances because there are no weedy relatives growing near the crop plant. However, in some cases, it may become a serious problem. For example, canola readily hybridizes with mustard weed species and could transfer its herbicide-resistant genes to those weeds. We know that evolution will occur when transgenic plants are grown on a large scale over a period of time. Of special concern is the development of insect populations resistant to the Bt toxin. This pesticide has been applied to plants for decades without the development of insect-resistant populations. However, transgenic Bt plants express the toxin in all tissues throughout the growing season. Therefore, all insects carrying genes that make them susceptible to the toxin will die. That leaves only the genetically resistant insects alive to perpetuate the population. When these resistant insects mate, they will produce a high proportion of offspring capable of surviving in the presence of the Bt toxin. Farmers are attempting to slow the development of insect resistance in Bt crops by, for example, planting nontransgenic border rows to provide a refuge for susceptible insects. These insects may allow Bt susceptibility to remain in the population. Perhaps the most serious concern about the transgenic crop plants currently in use is that they encourage farmers to move farther away from sustainable agricultural farming practices, meaning ones that allow natural resources to continually regenerate over the long run. Transgenics, at least superficially, simplify farming by reducing the choices made by the manager. Planting a

glyphosate-resistant crop commits a farmer to using that herbicide for the season, probably to the exclusion of all other herbicides and other weed-control practices. Farmers who use Bt transgenics may not feel that they need to follow through with integrated pest-management practices that use beneficial insects and timely applications of pesticides to control insect pests. A more sustainable approach would be to plant nontransgenic corn, monitor the fields throughout the growing season, and then apply a pesticide only if and when needed.

question 1

According to paragraph 1, which of the following is true of transgenic plants that produce the protein Bt?

A They are resistant to certain herbicides.

B They grow best in the United States.

C They were treated with the chemical glyphosate.

D They are resistant to destruction by insects.

question 2

According to paragraph 2, supporters claim that producing transgenic plants enables farmers to

A increase crop production by up to 21 percent

B use fewer and less toxic chemicals

C control weeds without the use of glyphosate

D take advantage of more effective herbicides

question 3

Which of the following can be inferred about monarch caterpillars from paragraph 3 ?

A They often cause damage to corn crops.

B They are the only species that is immune to Bt toxin.

C They are considered beneficial insects.

D Their reactions to Bt pollen have not yet been studied.

question 4

What conclusion does the author make in paragraph 3 about the effect of Bt plants on nontarget organisms?

A Bt toxins do not affect nontarget organisms because the toxins only harm pests that eat the leaves, stems, or fruit of the plants.

B Bt plants have been shown in field studies to cause great harm to nontarget organisms.

C Bt plants do not cause as much harm to nontarget species as the use of conventional pesticides.

D Even if Bt toxins do not affect the insects that feed on the plants, they have harmful effects on birds that eat these insects.

question 5

Why does the author mention "mustard weed species" in the discussion of plants that hybridize?

A To give an example of a weed that may become resistant to glyphosate due to hybridizing with a transgenic plant

B To argue that creating transgenic plants in the laboratory is not always necessary, as some can be created through hybridizing in the fields

C To provide evidence that competition from related species of plants can be a serious problem for transgenic plants

D To support the claim that it is difficult to determine whether or not a crop plant has been planted a safe distance from weedy relatives

question 6

Paragraph 5 makes all of the following claims about Bt resistance in insect populations EXCEPT:

A Regular use of Bt pesticides has not created resistant insect populations, so the use of Bt plants is probably safe as well.

B The evolution of Bt-resistant insect populations will happen eventually if use of transgenic plants becomes widespread.

C Because Bt plants are toxic at all times and in all tissues, they allow only Bt-resistant insects to survive and reproduce.

D Planting nontransgenic plants alongside Bt plants may help Bt-susceptible insects to remain part of the population.

question 7

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A The transgenic crop plants currently in use are probably far behind the transgenic plants of the future in terms of their sustainability.

B Farmers who use transgenic crop plants are heading toward practices that allow natural resources to continually regenerate over the long run.

C Transgenic crop plants may be used in place of other, more sustainable agricultural practices, and this is perhaps their biggest disadvantage.

D Perhaps the most serious concern about the transgenic crop plants currently in use is the possibility that they may not be sustainable over the long run.

question 8

According to paragraph 6, a sustainable approach to weed and pest control includes all of the following EXCEPT

A watching the fields closely to determine when weeds or pests are actually a problem

B not applying pesticides unless or until pesticides are needed

C using only one type of herbicide throughout the growing season

D planting nontransgenic crops

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

Genes from virtually any organism, from viruses to humans, can now be inserted into plants, creating what are known as transgenic plants. Now used in agriculture, there are approximately 109 million acres of transgenic crops grown worldwide, 68 percent of which are in the United States. The most common transgenic crops are soybeans, corn, cotton, and canola. Most often, these plants either contain a gene making them resistant to the herbicide glyphosate or they contain an insect-resistant gene that produces a protein called Bt toxin. On the positive side, proponents of transgenic crops argue that these crops are environmentally friendly because they allow farmers to use fewer and less noxious chemicals for crop production. For example, a 21 percent reduction in the use of insecticide has been reported on Bt cotton (transgenic cotton that produces Bt toxin). In addition, when glyphosate is used to control weeds, other, more persistent herbicides do not need to be applied. On the negative side, opponents of transgenic crops suggest that there are many questions that need to be answered before transgenic crops are grown on a large scale. One question deals with the effects that Bt plants have on nontarget organisms such as beneficial insects, worms, and birds that consume the genetically engineered crop. For example, monarch caterpillars feeding on milkweed plants near Bt cornfields will eat some corn pollen that has fallen on the milkweed leaves. Laboratory studies indicate that caterpillars can die from eating Bt pollen. However, field tests indicate that Bt corn is not likely to harm monarchs. Furthermore, the application of pesticides (the alternative to growing Bt plants) has been demonstrated to cause widespread harm to nontarget insects. Another unanswered question is whether herbicide-resistant genes will move into the populations of weeds. Crop plants are sometimes grown in areas where weedy relatives also live. If the crop plants hybridize and reproduce with weedy relatives, then this herbicide-resistant gene will be perpetuated in the offspring. [] In this way, the resistant gene can make its way into the weed population. [] If this happens, a farmer can no longer use glyphosate, for example, to kill those weeds. [] This scenario is not likely to occur in many instances because there are no weedy relatives growing near the crop plant. [] However, in some cases, it may become a serious problem. For example, canola readily hybridizes with mustard weed species and could transfer its herbicide-resistant genes to those weeds. We know that evolution will occur when transgenic plants are grown on a large scale over a period of time. Of special concern is the development of insect populations resistant to the Bt toxin. This pesticide has been applied to plants for decades without the development of insect-resistant populations. However, transgenic Bt plants express the toxin in all tissues throughout the growing season. Therefore, all insects carrying genes that make them susceptible to the toxin will die. That leaves only the genetically resistant insects alive to perpetuate the population. When these resistant insects mate, they will produce a high proportion of offspring capable of surviving in the presence of the Bt toxin. Farmers are attempting to slow the development of insect resistance in Bt crops by, for example, planting nontransgenic border rows to provide a refuge for susceptible insects. These insects may allow Bt susceptibility to remain in the population. Perhaps the most serious concern about the transgenic crop plants

currently in use is that they encourage farmers to move farther away from sustainable agricultural farming practices, meaning ones that allow natural resources to continually regenerate over the long run. Transgenics, at least superficially, simplify farming by reducing the choices made by the manager. Planting a glyphosate-resistant crop commits a farmer to using that herbicide for the season, probably to the exclusion of all other herbicides and other weed-control practices. Farmers who use Bt transgenics may not feel that they need to follow through with integrated pest-management practices that use beneficial insects and timely applications of pesticides to control insect pests. A more sustainable approach would be to plant nontransgenic corn, monitor the fields throughout the growing season, and then apply a pesticide only if and when needed.

question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. Proponents of transgenic plants argue that they reduce the use of harmful pesticides and allow the use of more environmentally friendly herbicides.

B. Opponents of transgenic plants worry that resistance to glyphosate may spread to weeds and that resistance to Bt toxin may develop among insect pests.

C. Use of transgenic plants may lead farmers to neglect more sustainable agricultural practices, and may also cause harm to nontarget organisms.

D. One argument against Bt plants is that some of the most harmful pests are not Bt susceptible, making application of supplementary pesticides necessary.

E. Over the long term, transgenic plants are likely to lose their glyphosate resistance through evolution and hybridization with nonresistant relatives.

F. Many of the problems identified with transgenic plants today will likely disappear as scientists design transgenic plants that are more ecologically friendly.