Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Underline important

concepts as you read.

Points will be deducted

if you don’t.

Block: \_\_\_\_\_

**Flavr SavrTM Tomatoes: Genetically Engineered For Better Storage, Taste**

You have probably heard the saying, “One rotten apple spoils the lot.” You may not know that saying is as true of tomatoes as it is of apples. However, researchers at several agricultural companies have been working to slow the process of ripening and decay in fruit and vegetables. Eventually the efforts of researchers may make the saying about rotten apples a thing of the past.

**Natural Ripening Process:** Both the ripening and the decay of fruit are stages of one process. Ripening apples, and some other kinds of ripening fruit and vegetables, make the gas ethylene. The ethylene gas speeds up the process of ripening. Ethylene gas controls such chemical processes as the loss of chlorophyll, the increase of sugars, and the softening of tissues in ripening fruit. Some plant cells respond to ethylene by producing enzymes that soften fruit.

After apples start to ripen, they continue to produce more ethylene gas. The gas eventually causes the apples to ripen until they rot. The more an apple decays, the more ethylene it makes. Consequently, ethylene gas damages the first rotting apple in a barrel and also starts the process of decay in other apples around it. This process is the basis for the above saying.

**Helping Farmers and Grocers:** The fact that fruits and vegetables decay naturally is not very beneficial to farmers and grocers. Farmers and grocers want produce to last as long as possible after it is harvested. Farmers want to ship unspoiled fruit and vegetables to markets. Grocers want the produce in their stores to look good because shoppers usually buy only the healthiest-looking fruit and vegetables. Cooling produce by refrigeration is one way that farmers and grocers have slowed the natural process of decay.

Recently, researches at the Calgene Company in California found a new way to keep tomatoes from spoiling so quickly. In a new tomato variety called Flavr Savr TM, Calgene scientists partly turned off one of the ripening genes. Normally this particular ripening gene produces an enzyme that makes the cell walls of the tomato soften. The researchers inserted a foreign gene into the Flavr Savr TM tomato to prevent the ripening gene from making a normal amount of the ripening enzyme. Because it lacks the normal amount of ripening enzyme, the Flavr SavrTM tomato ripens much more slowly.

The foreign gene interferes with the process of protein synthesis. During protein synthesis, messenger RNA is produced by a gene that is making a protein. The messenger RNA acts as a template for the synthesis of the protein. Normally the messenger RNA is a single-stranded molecule that resembles one-half of a zipper.

The foreign gene makes a mirror image of the normal messenger RNA molecule. The mirror image looks like the other half of the zipper. In the cells of the Flavr SavrTM tomatoes, the normal RNA and its mirror image bind together like the halves of a zipper. When the two kinds of RNA bind together in the cells, the cells cannot produce the ripening enzyme.

**Benefits of the New Tomato:** The Flavr SavrTM tomato resists decay better than the other tomato varieties. As a result, this new tomato can stay on the vine longer to acquire a better tomato taste. Moreover, staying on the vine longer potentially allows the tomato to develop a higher nutritional value. Because it remains firm for a longer period of time, the Flavr SavrTM tomato is also easier to ship and will last longer in the grocery store.

**(Questions on back)**

1. Describe the process that causes many kinds of fruit to decay **(2 pts)**
2. Why do farmers and grocers want fruit and vegetables to last as long as possible?  **(2 pts)**

Farmers**:**

Grocers:

1. What did the Calgene researchers do to slow the process of decay in the Flavr SavrTM tomato? **(2 pts)**

1. What are three benefits of the spoil-resistant tomato? **(3 pts)**
2.

 2.

3.

 Did you underline the important concepts when you READ the article? **(1 pt)**