

Grocery Store Botany

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This laboratory exercise has been used to introduce students to taxonomic keys and the names given to various plant fruits. Materials needed for the laboratory include kitchen knives, dining hall trays, and a large variety of fruits and vegetables from the local store or collected in the field. Figure 1 is the key used by the students for this laboratory, while Table 1 is used by the instructor during preparation for the laboratory.

Before the laboratory session the fruits are distributed on one table in the front of the laboratory room. Student interest is stimulated as they arrive for class by letting them handle the fruit. Usually the students are not told what will happen in this laboratory, so they are always a little curious. The laboratory session begins with an explanation of the taxonomic key: why scientists use keys, how keys are used, and differences between keys. Also, some of the terminology used in the key is explained, for example, the difference between simple fruits (*2a*) and fruits derived from more than one pistil (*2b*). The particular key shown in Figure 1 is simplified for use with non-biology major students, thus some of the technical taxonomic vocabulary has been simplified, for example, the term accessory fruits (*4b*) is usually explained not as superior and inferior ovaries, but as to the location of the flower in relation to the fruit.

After all introductory remarks have been made, the laboratory exercise is started by the instructor tossing one of the fruits to a student and asking them to key the fruit “out-loud,” while the other students are asked to agree or disagree with the “keying” student. This process is usually started with a fruit that is easily keyed, for example a peach or cherry. Students are not allowed to make assumptions. For instance, if they come to a question “Fruits with more than one seed...(*3b*)” and they answer “Yes,” the instructor then counters with “How do you know that?!” At this point the student is requested to prove their answer by cutting open the fruit and displaying the seeds. Once the fruit has been keyed, the student can then distribute the fruit to the other students for consumption. The laboratory is usually ended with the keying of a pineapple, which all the students seem to enjoy eating.

This laboratory allows for a great deal of creativity. The variety of fruits available can change with the season. Discussions can be built around the different fruits such as seedless oranges, hybrid corn, and pineapple production. In conclusion, this laboratory can be quite fun, noisy, and tasty.

Table 1. Key to common fruits.

- 1a.** Fruits fleshy (at maturity).
- 2a.** Fruits simple (i.e., derived from a flower with a single pistil).
- 3a.** Fruits with a single seed enclosed in a hard pit *DRUPES*
- 3b.** Fruits with more than one seed, the seeds not enclosed in a hard pit (one or more seeds do not develop in avocados and the common banana).
- 4a.** Fruits derived from the ovary only (fruit below the flower - look for the old sepals *BERRIES*
(berries with a thin skin are referred to as *TRUE BERRIES*; berries with leathery skin containing oils are referred to as *HESPERIDIUMS*).
- 4b.** Fruits derived from the ovary plus other parts of the flower (*accessory fruits*).
(Fruit above the flower - the flower is on the end of the fruit).
- 5a.** Fruits with a relatively hard rind *PEPOS*
- 5b.** Fruits without a hard rind.
- 6a.** Endocarp leathery or papery *POMES*
- 6b.** Endocarp not leathery or papery *FALSE BERRIES*
- 2b.** Fruits derived from more than one pistil.
- 7a.** Fruits derived from a single flower having several to many pistils *AGGREGATE FRUITS*
- 7b.** Fruits derived from several to many separate flowers in an inflorescence, the fruits coalescing to varying degrees to form a single "fruit" at maturity *MULTIPLE FRUITS*
- 1b.** Fruits dry (at maturity).
- 8a.** Fruits not splitting at maturity.
- 9a.** Fruits with a wing *SAMARAS*
- 9b.** Fruits without a wing.
- 10a.** Fruits with a hard shell surrounding the seed *NUTS*
- 10b.** Fruits without a hard shell.
- 11a.** Fruit wall fused to the seedcoat *GRAINS*
- 11b.** Fruit wall with seed loosely attached *ACHENES*
- 8b.** Fruits splitting in various ways at maturity.
- 12a.** Fruits splitting along or between carpel lines or forming a cap that comes off or a row of pores near the top *CAPSULES*
- 12b.** Fruits splitting lengthwise along the edges.
- 13a.** Fruits leaving a central partition to which the seeds are attached *SILIQUES OR SILICLES*
- 13b.** Fruits not leaving a central partition.
- 14a.** Fruits splitting along one edge only *FOLLICLES*
- 14b.** Fruits splitting along both edges *LEGUMES*

Figure 1. Common types of fruits.

Class	Type	Consistency (dry or fleshy?)	Dehiscence	Seeds	Other Characteristics	Examples
Simple	Achene	dry	none	1	seed attached at one point	buttercup; strawberry "seeds"
	Cypsela	dry	none	1	an achene derived from an inferior ovary and having an accessory coating fused to the pericarp	sunflower and dandelion "seeds"
	Samara	dry	none	1	achene with a wing	maple, ash
	Caryopsis (grain)	dry	none	1	seed coat and pericarp fused together	corn; wheat
	Nut	dry	none	1	in true nut, pericarp stony; sometimes name applied to seeds (Brazil nuts), legumes (peanuts), or endocarp and seed of drupe (almond)	acorn; chestnut
	Schizocarp	dry	none	2-several	split into one-seeded sections, each section like an achene	carrot; mint
	Follicle	dry	along one line	many	a pod derived from one carpel	milkweed; larkspur
	Legume	dry	along two lines	1-several	a pod derived from one carpel	bean; pea
	Loment	dry	along two lines	1-several	a legume constricted and jointed between seeds	tick trefoil
	Silique	dry	along two lines	several-many	elongated type of capsule composed of two carpels that split apart leaving a partition to which seeds are attached	turnip; mustard
	Silicle	dry	along two lines	several-many	a short silique, little if any taller than wide	penny-cress; shepherd's purse
	Capsule	dry	along two or more lines	many	derived from two or more carpels	cotton; poppy
	Berry	fleshy	none	1-many	derived from one or more carpels	tomato; grape
	Hesperidium	fleshy	none	several-many	a type of berry covered with a leathery rind	citrus fruits
	Peppo	fleshy	none	several	a type of berry covered with a hard rind	watermelon; squash
	Drupe	fleshy	none	1	endocarp stony	cherry; plum; almond
	Pome	fleshy	none	several	arising from an inferior ovary (core) surrounded by and fused to a fleshy hypanthium	apple; pear
Aggregate		dry or fleshy	none or	usually one seed in each of many fruitlets	derived from several pistils of one flower, rose "hip" is a fleshy hypanthium enclosing achenes: the "berry" has a fleshy receptacle supporting achenes or drupelets	rose; blackberry; strawberry; pomegranate
Multiple		dry or fleshy	none	usually one seed in many fruitlets	derived from pistils of several or many flowers clustered together	ear of corn; pineapple; mulberry; fig; osage orange