

Soybean Plants Killed before Maturity Possess Grain that Remains Green

By Bill Wiebold

Delayed planting of soybean in the spring and early summer resulted in delayed maturity this fall. This delayed maturity was increased by the unseasonably cool temperatures in August through October. Unfortunately, many soybean fields in Missouri experienced freezing temperatures before plants were fully mature. When temperatures drop quickly, ice crystals form inside plant cells. Because water expands upon freezing, plants cells and their membranes are literally torn apart. As temperatures rise and plant tissues thaw, cell contents leak outside the cells and the plants quickly die.

If soybean plants are killed before physiological maturity, seeds on those plants will not mature normally. Immature soybean seeds contain chlorophyll and are green because of this pigment. After plants reach physiological maturity, chlorophyll production in seeds ceases. Chlorophyll that is present in seeds and pods is broken down, partially by bleaching in sunlight, but also through natural metabolism. Premature death stops this natural degradation of chlorophyll and the seeds remain green. The extent of the green color depends on timing of premature death. If death occurs late in seed-filling, the green color is usually confined to the seed coat. This color may lessen over time with field drying or in storage. If death occurs during early to mid seed-fill, the green color remains throughout the interior of the seed. This color will probably not disappear even with long term storage.

Premature death of soybean plants will have little effect of concentrations of protein and oil in the seeds. Oil percentage may be slightly lower because oil accumulation occurs

mostly in the later phases of seed filling, but the effect will be small. However, the oil may be more difficult to extract. During soybean oil processing, both free fatty acids and green color are chemically removed. Prematurely dead soybean seeds often have increased levels of free fatty acids. If not removed during processing, these fatty acids combine easily with oxygen, turn rancid, and reduce shelf life of the oil. Chlorophyll will remain in the oil during extraction and must be removed from the oil. This extra processing will add to the expense and may reduce the amount of salable oil for processors.

Frost damaged soybean grain should store almost as easily as normal soybean grain, although aeration is strongly recommended. Seed moisture content will be higher than expected because seeds killed prematurely will not dry as quickly as seeds that mature normally. The usual precautions of foreign material and damaged seed coats apply to all stored soybeans. Plants killed by frost will retain leaves and stems may remain green. This can add moisture to grain or make grain difficult to separate from other plant parts. Prematurely killed soybean seeds will shrink to smaller than normal size and the shape



Figure 1. Soybean Seeds from prematurely killed plants.

will be more oblong than normal. Combine settings should be adjusted to account for these differences.

Nearly all USA soybean grain is classified and sold as yellow soybeans according to the "Official US Standards for Grain". Seeds with green seed coats should be classified as yellow soybeans and not docked. However, seeds in which less than 90% of the cross-section is yellow will likely be classified as "soybeans of other color." If the grain lot has more than 10% seeds of other color it may be graded as "standard" and may receive substantial dockage.

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