GROWING, STORING AND SELECTING POTATOES FOR CHIPS

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INTRODUCTION

Potato processing in the United States is increasing at a very rapid rate. It has risen from practically nothing in 1940 to 95 million bushels in 1959. This is about 30 percent of all potatoes consumed as food in the U.S. About one-half of the total amount processed is potato chips. This business continues to increase at a very healthy rate and now has surpassed the $500,000,000 per year volume. Potatoes for chips are grown in all the important potato producing areas and potato chip processing plants are located in every state of our country.

This increase in volume of chip sales is largely the result of extensive research by many workers on the methods of growing and storing potatoes best suited for chip manufacture. Much research on the various phases of processing the potatoes also has improved chip quality, colour, flavour, attractiveness and shelf life of the product.

Since the chip processor has been taught to be more exacting in his potato requirements than those usually purchased on the fresh market it is necessary that potato growers alter their normal methods to better suit the processors demands.

CULTURAL METHODS AFFECTING POTATOES FOR CHIPS

Many factors, some under the control of the grower, may influence the desirability of potatoes for processing, viz.

Maturity. This factor is highly desirable in potatoes for chipping. Immature potatoes usually are of low specific gravity and, therefore result in low yields of chips with high oil content. Colour of chips from immature potatoes which are stored is likely to be undesirably darker than chips from mature potatoes. Mature potatoes also are more quickly and satisfactorily reconditioned for chip making after storage than are less mature tubers.

The chemical composition of mature and immature potatoes may vary considerably. However, more important than their composition at harvest time are the changes which they undergo during storage. At the same storage temperature, for instance, potatoes harvested immature will accumulate more reducing sugars than those grown to a greater degree of maturity. Immature potatoes such as those harvested in the southern part of the country process to a desirable colour if they are fried soon after harvest and are not subjected to cool temperatures during transit.

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Maturity can be obtained best by planting early as possible, harvesting late and by killing potato vines fairly slowly so that food manufactured in the leaves may be translocated to the tubers. Other factors which tend to hasten maturity are a fairly low nitrogen and potash supply, high supply of phosphorus not too high rainfall or application of irrigation water and withholding insecticide sprays late in the season.

Specific gravity or dry matter content of potatoes. This factor is closely associated with maturity of tubers and is exceedingly important as an excellent tool or yardstick to determine the processing quality of potatoes. It determines the yield and oil content of chips and to some degree it also is associated with chip colour. It should be high, indicating that the potatoes are low in water content. Practically every processor of any consequence in the United States has from one to twenty potato hydrometers for measuring the specific gravity of representative lots which are being considered for processing. This instrument which we developed in 1960 quickly and accurately determines the gravity of any lot of potatoes. It is sold by the Potato Chip Institute International.

Effects of fertilization. The kind and amount of fertilizer applied affects maturity and specific gravity of tubers. Nitrogen promotes extensive vine growth and prolongs the growing season. As a result, potatoes do not become mature by harvest time, and chemically, are poor risks as chipping potatoes after several months storage at 40 F. Sufficient nitrogen should be available to obtain high yields but not an excess which results in continuous green vines until they are killed by frost or by the grower.

Potash also affects specific gravity of potatoes. When heavy applications of muriate of potash are made, either alone or in a complete fertilizer, specific gravity generally is decreased. This decrease is a result largely of the chlorine rather than the potassium portion of the fertilizer. Sulfate of potash when applied to the soil to supply the same amount of potassium as in muriate of potash, usually results in higher gravity potatoes.

Soil moisture. Rainfall and irrigation may affect specific gravity of potatoes considerably. In most instances irrigation increases yields. In some cases application of water results in increased total solids, in others, a decrease and in many instances no change at all. The reason for these differences largely is the change in soil temperature as a result of adding water to dry soil. Irrigation water cools the soil. If this occurs during a period of high temperature less solid matter is lost by respiration from the potatoes in the moistened, cooler soil, hence more remains in the tuber and the potato, therefore, has higher total solids. Water also makes nitrates more available to the plant and this may prolong the growing season and delay the storage of solids, hence at harvest solids may be lower than where no water was applied. Water applied late in the season also tends to increase moisture content of the tuber and, therefore, decreases their total solids of dry matter content.

Spraying. Control of insects and diseases by application of sprays and dusts also has an effect on quality of potatoes for chipping. In most areas in the United States it is