## SELECTION CRITERIA FOR BREEDING WRINKLED PEAS SPECIALLY SUITED FOR FREEZE-DRYING

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A breeding program is underway to develop varieties of peas which are specially suited to freeze-drying. Parental lines for crosses were chosen from among 55 wrinkled varieties surveyed. Some of the special criteria considered in the selection were: color of the fresh, immature pea; absence of seedcoat splitting; quality of peas after freeze-drying; and the rehydration properties (i.e. maintenance of shape of the green peas). Examination of these quality characteristics was begun in F3 families derived from 3900 single F2~single plants, originating, in turn, from 78 crosses.

R.H.S. color charts were used to evaluate the color intensity and variation in samples of fresh, deep-frozen, freeze-dried, and rehydrated green peas. Progenies with light green color were rejected (group yellow-green 145 A-D). Samples from advanced generations were also studied to determine the influence of the seedcoat and cotyledons on the color of green peas. From this the following conclusions were drawn: 1) Color of the seedcoat, which can vary from white to dark green, is of importance because the cotyledons themselves are always green (with the exception of the off-color "blonds"). 2) The thickness of the seedcoat increases the color of cotyledons when the seedcoats are green and diminishes it when the seedcoats are white and thick. 3) Seedcoat and cotyledon color affect the maintenance of color, which normally brightens during the freeze-drying process, and also influence the recovery of shape of freeze-dried peas after rehydration.

Rehydration in boiling water was strongly influenced by the shrinking of either the cotyledons and/or the seedcoat. The term "quality of green peas" after freeze-drying reflects a capacity to rehydrate and this is based on two essential charactistics: 1) rapid swelling of the cotyledons and 2) good permeability of the seedcoat. Selection against seedcoat splitting ordinarily is a desirable goal when breeding garden peas for canning or freezing, but non-split seedcoats do not rehydrate rapidly and thus are undesirable from the standpoint of breeding for adaptability to freeze-drying. Because of the highly significant correlation between seedcoat splitting after freeze-drying and rehydration capacity, it may be necessary to select lines which show seedcoat splitting to some extent (i.e. clefts from 3 to 1 mm); if not, the seedcoat must be perforated mechanically.

The structure of the seedcoat of fresh, frozen, and freeze-dried peas was examined microscopically. The thickness of palisade tissue (macro- and osteosclereids) was not affected even after preservation and only the parenchyma, which also determines the thickness of the seedcoat, was influenced by deep-freezing and freeze-drying. The greater destruction of parenchyma may result in less seedcoat splitting.

The selection criteria described appear to be heritable characters in view of the selection results achieved. Genetical analyses have just begun.