

**Derivation and Comparison of Androgenic and Gynogenic
Monoploid Potato Families**

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(ABSTRACT)

Monoploid potato ($2n = 1x = 12$) can be derived either paternally through anther/microspore culture or maternally through crossing with a haploid-inducing pollinator. Evidence from other genera suggests that androgenic and gynogenic haploid populations derived from the same parent may differ due to gametic selection and/or epigenetic factors. Our objectives were to derive androgenic and gynogenic monoploid populations from each of two diploid ($2n = 2x = 24$) *Solanum phureja* clones and compare their phenotypic characteristics in a greenhouse study. A haploid-inducing pollinator, *S. phureja* IVP101, was crossed to two selections of *S. phureja* (PP5 and BARD1-3). A total of 185 fruit was obtained from PP5 and 398 from BARD1-3, resulting from 85% and 65% fruit set, respectively. Seed lacking the dominant embryo spot marker carried by IVP101 were selected and germinated *in vitro*. From 29,300 PP5 \times IVP101 seeds, 278 were spotless, resulting in 27 monoploids. Approximately 37 monoploids were obtained from the 99,500 BARD1-3 \times IVP101 seeds of which 500 were spotless. In anther culture, PP5 and BARD1-3 yielded 0.16 and 1.67 embryos per anther respectively of which 51% and 44% of the regenerants were monoploid. A total of 32 anther-derived monoploids has been obtained from PP5 and 130 from BARD1-3. Rooted cuttings of 21 androgenic and 21 gynogenic PP5 monoploids were established in a greenhouse in each of three randomized complete blocks. Although the anther-derived monoploids appeared more vigorous, none of the differences between the two populations were significant. Flow cytometry revealed that anther derived progeny of PP5 and BARD1-3 had 3-8% greater nuclear DNA content than gynogenic monoploids derived from the same parental clones.

DEDICATION

This thesis is dedicated to my parents Edwin and Wanda Cutright who brought me into the world and devoted themselves to my education. In spite of the many personal sacrifices required and the open criticism expressed by their peers, they educated me at home; as they knew this was right in God's eyes and the means of giving me the best education possible. They have taught me many things well but most importantly to seek God and honor Him. My successes are merely a reflection of theirs, and I hope, a tribute to them.

Blessed be the name of God forever: for wisdom and might are his: And he changeth the times and the seasons: he removeth kings and setteth up kings: he giveth wisdom to the wise, and knowledge to them that know understanding: He revealeth the deep and secret things: he knoweth what is in the darkness, and the light dwelleth in him.

(Daniel 2:20b-22).

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