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Bean Variety, Bean Portion and Growth Response of Mice and Rats

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Black beans are a staple in the diets of many Guatemalan people. Bean broth, the liquid portion of the cooked beans, is consumed by young and old (1). Soluble tannins are concentrated in the broth (2). While the amount of broth consumed by most adults is small in relation to the rest of their diets, when fed to children as a weaning food any deleterious effects of the broth may be magnified (3).

Experiments have been conducted demonstrating that additional broth added to beans and fed to rats retards growth (4). However, the retardation was not uniform. That is, two, three or four times the quantity of normal broth in the diet did not result in uniformly increasing growth depression (4). The objective of these trials was to establish the effect of broth without beans upon rat growth.

Broth preparation was accomplished by soaking Black Turtle Soup cultivar beans for 24 h, autoclaving 15 min. at 15 lb. pressure in water three times the weight of the beans. The broth was strained from the beans, frozen and lyophilized. Constraints of available freeze dryer space and low solids of broth from beans resulted in mice being chosen as the animal model. Mice eat about one-third as much feed as rats.

Four test diets were fed to mice, namely: broth, beans and broth, beans only, beans and broth of Tamazulapa cultivar black beans, and casein control. Two rat diets were tested, beans and broth and casein control, to compare with the diets of Swanson and Bressani (1983) in which increasing amounts of broth were added to beans and fed to rats. In the broth and bean diets, no "broth only" diets were fed (4).

Diets were isocaloric and isonitrogenous with half the protein coming from casein, the rest from beans. Dried bean broth provided 18.5% crude protein (CP) and casein 19% CP. Adjustments to the basal diet to compensate for the weight differences in protein sources were made by adding various amounts of dextrose so the diets would be fed on an equal weight basis.

Male weanling rats and mice had initial average weights of 105 g and 21 g, respectively. Preliminary results indicate rats fed bean broth protein grew less well than any other group. Mice fed the broth diet were more active during the day, consistently wasted more feed, and were more aggressive than other mice. In both rat and mouse trials, bean and broth diets resulted in retarded growth compared to the casein diet.

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Bean Rust in the United States in 1984

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In 1984, rust caused by Uromyces appendiculatus (=U. phaseoli), was severe on dry beans in the Red River Valley of North Dakota and Minnesota as well as on snap beans in New Jersey, the Delmarva Peninsula, Tennessee, and Florida.

A Uniform Snap Bean Rust Nursery (USBRN) with 32 entries from four private and two public breeders was grown at five locations. Ten additional entries were grown at two to four of these locations. Severe natural epidemics occurred in the late summer nurseries in Bridgeton, NJ (Joe Steinke, cooperator), Crossville, TN (Jim Hilty and Charles Mullins) and Painter, VA (Bob Baldwin and Ricky Sterrett). Light natural infection occurred in the spring nursery in Gainesville, FL (Dick Berger). Spreader rows were inoculated with locally collected urediniospores in NJ and VA and with races 38, 39, 40, 41, and 43 (2) at Beltsville, MD where a severe late summer epidemic also developed. Race 38 was the predominant race on snap beans in NJ, VA, FL, and probably TN, but at least one additional race was present in every location. Entries resistant (R) (1) or better at all locations of the USBRN, based upon reaction grade (1,3), were BARC-Rust-Resistant (RR) -2,-3,-4, and -5 (4) and H491A-2-3. Entries moderately susceptible (MS) or more resistant at all locations included Mox 8037, H491B-1-1-3-1, H492-3-1, H496-4, H531-5-1, H630-4-4 (wax) and Earlybird. Greenhouse tests indicated that all of the more resistant entries except the BARC-RR lines are MS to some races and resistant (R) or highly resistant (HR) to others. The BARC-RR lines are HR or R to all of the presently described races available except tentative race 58 to which they are moderately resistant (4).