Evolutionary Plant Breeding

Coit A. Suneson

IN my formative years, two crop scientists in particular kindled my research interest. Interestingly enough, neither was a classical teacher. Instead they were research men with fresh ideas and attitudes. These ideas were uniquely interrelated as regards both materials and applications. Furthermore, time has not dimmed their importance. I speak of Dr. H. V. Harlan and Dr. N. I. Vavilov, a Russian. Much of what I will report grew from proliferating Harlan's materials or their combined philosophies. In this, two of Harlan's other associate-trainees, G. A. Wiebe and Harland Stevens, were particularly helpful. Thus, two field stations, Davis, Calif., and Aberdeen, Idaho, became closely associated. The time period I will discuss exceeds 40 years.

During this period there were four distinct experimental climates. In Harlan's later years there was strong emphasis on applied results and almost exclusive pure-line breeding. Later our grain surpluses gave our profession an ego which generated an image of technical sufficiency and security. When this began to weaken, much of the new research tended to avoid applied problems. Now there is urgency to help feed a hungry world. Tonight I'm really asking if our professional attitudes and activities over this period have not left us rather poorly prepared for this very big job.

My life with barley began with my transfer from Nebraska to California in 1936. It has been characterized principally by persistent perseverance in the promotion of materials and methods. Some of these have involved "drastic" departures from convention when drastic has the meaning associated with its use in mutation breeding. During my first year of association with barley, I discovered male-sterility and began searching evolutionary breeding with the Composite Cross populations which I inherited, notably C.C. II, F10. Such drastic actions quickly disassociated me from the mainstream of crop science conventions. But I wasastute enough to continue to hatch some of my eggs under hens rather than in my new control chambers. A tie with the past apparently is a professional requirement for survival.

those then researching barley (except for a few who soon discovered msms) ignored the concept. Instead there was substantial concern on basic research to establish the linkage of sterile (which I, too, had tried). In this mass failure because the genetic tool we used over — was not suited to a gene so near to here. An apathy and a frustration developed even the chromosome aberrations techniques developed during the 1950's for study of the presently not generally break. Consequently, the new discovered in other crops, all of later vintage, have had more acceptance and use. This for recent work, principally in Montana. Harlan has discovered about 25 more genetically distinct steriles in barley. Literally interpreted, one that most barley investigators could and should have independently discovered male-sterility (and other useful sterilities) in their own material. One 1966 national conference on hybrid barley told this story in another way. With commercial hybrid imminent, only a half dozen laboratories had ventured in depth to contribute. About a like number in crash programs to gain information. The others were very costly. The others apparently were not to be handed the complete instructional kit of my associates. I would have you know that the research attitude of barley workers are neither complacent or unopportunistic among the crop.

Since 1937 my uses of the Composite Cross population have included (1) treating them in yield tests, (2) making a census of genetic shifts, and (3) imposing and studying selection pressures on sub-populations. Two populations were used: those produced with by Harlan and his associates beginning in the twenties, and those which I produced by me as the hybridizing facility beginning in 1948. populations, particularly those produced by rather broad early generation use for exploit line selection. The populations were then discarded on the premise that once sampled they be-