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FIRST THE SEED
James C. Delouche ^{1/}

It is appropriate - at the beginning of this 1964 Short Course - to pause for a few minutes before considering the more germane aspects of seed technology and consider the seed itself. For the seed is one of nature's truly marvelous inventions. An incredible example of miniaturization, a vital link in the unbroken thread of life - the importance of the seed was early recognized by man.

Two of the most critical turns in man's long struggle toward civilization involved seeds. Early man came to understand that allowing some of the wild-growing grains he collected to fall to the ground increased the probability of a crop of grain at that spot the following year. Whether man then understood the function of seed is debatable - he may have only been appeasing the spirit of the grain or the soil with an offering. The next giant stride toward civilization came with the discovery that collected seed under favorable conditions could produce plants and grain far from the area in which they naturally occurred. Perhaps a grain crop produced from seed spilled by a hunter around a camp site clued in the discovery. These discoveries had a powerful influence on the course of human history. By collecting seed of desirable plants, storing them and at the proper time sowing them in soil of his choice - man overcame the shackles of a nomadic existence, settled down and developed the concepts of the village, division of labor, and the dim outlines of our modern agricultural-industrial economy.

Man and seeds have long been inseparable. Among the important supplies carried by the Pilgrims to the New World were seeds. Ben Franklin always brought back seeds from his many trips abroad. Thomas Jefferson took time from his studies of Italian art to smuggle rice seed out of Italy - such an act being illegal under Italian law at that time. A curious but illuminating example of the "togetherness" of man and seeds is found in the name given to a common weed by the Indians. They called it "white man's foot print" because it flourished everywhere the white man had been - scattered over the land.

Over 60 percent of the food consumed by mankind is seed or seed products such as flour, meal, oil, etc. If we stretch the definition of "seeds" to include vegetative reproductive structures such as tubers, then the portion of man's food from "seed" is over 75 percent. Stored in seed are three important nutrients: carbohydrates, fats and oils, and proteins. Americans get much of their proteins from meat, but in many countries the principal source of proteins is seed.

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The essential role of seed lies in its generative function - the capacity to reproduce (or produce) that from which it came - the grain and fibers, the grass and the trees.

There is a point in the life cycle of every plant when the balance of physiological processes shift from growth to reproduction - and therein lies the genesis of the seed. Flowers are produced in their myriad of shapes, colors, sizes and fragrances. As the male and female organs mature, the nuclei of certain cells undergo reduction-division, i. e., the paired chromosomes of one cell are equally distributed to two daughter cells. The pollen is released, lights on a stigma, germinates, and the tube grows down the style. The reduced nuclei of the male and female elements fuse and develop into an embryo with a normal chromosome complement. The fusion of the male and female elements combines hereditary traits from the male and female parents and determines the characteristics of the offspring. Plant breeders apply their particular efforts at this stage. In an associated phenomenon (double fertilization), one reduced male nucleus fuses with two reduced female nuclei giving rise to the endosperm - the starchy part of a wheat or corn grain.

After fusion of the male and female nuclei, the cells continue to divide and the embryo takes on a characteristic form - differentiates into various organs. The ovule and the enclosed embryo (and endosperm) are gradually transformed into the seed. There are several distinct phases in this transformation: a time when some of the "seeds" develop the capacity to germinate, a time when all seeds are capable of germination, a time when maximum seed size is attained, a time when the maximum amount of dry matter has accumulated in each seed, and a time when the seed has dried sufficiently to naturally fall from the plant (except in fleshy fruits).

The mature seed is a thing of beauty - with a symmetry, a hue, an elegance of form and sculpturing, unmatched in nature.

A parachuted dandelion seed floats in the wind, a bird drops a tree seed in flight, a cocklebur floats in the run-off of a fall rain - somewhere they come to rest. And the cycle begins again.