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Seed Additives: Coating/Pelleting

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SEED ADDITIIVES: COATING/PELLETING

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Application of organic and inorganic substances to seed was described in the literature over 100 years ago. Prior to engineering precision seed planters, economic production of most vegetable crops and in particular root crops such as carrots was limited by the high labor expense of thinning a stand. Coating and pelleting of seed improved seed size and shape uniformity and insured precision planting with state of the art planters. Additionally, coated seed substantially reduced the labor costs of thinning a crop and increased to 90% plus the marketable pack-out product.

With the realization that forages were of agronomic and economic significance, scientists, growers and governmental agencies increased sowing of forages on marginal soil types and rugged terrains. Aerial seeding opened new areas but lack of adequate seed ballistics produced less than uniform results. The additional weight of coating rendered the needed ballistics and provided a delivery system of biological organisms and chemical agents along with the seed to improve stand establishment.

Seed size and planting methods for large grain seed are such that handling is not a major problem. Nevertheless, reasons for coating and pelleting grain seed include flexibility in sowing time and uniform seed size to reduce the number of graded seed types that are carried in inventory by hybrid seed companies. Additionally, loading capacity through coating onto seed provides a delivery system to the zone of utilization for multi-functional and protectant compounds.

Today, a combination of improved polymeric chemistry, exacting formulations, process specifications and quality assurance has provided multi-functional seed coatings whose benefits have been confirmed by researchers and been profitable for growers.

A wide variety of fillers can be employed with seed without toxic reaction. The selection of filler might therefore depend on factors including availability, ease of handling and the objective of circumventing undesirable soil conditions.

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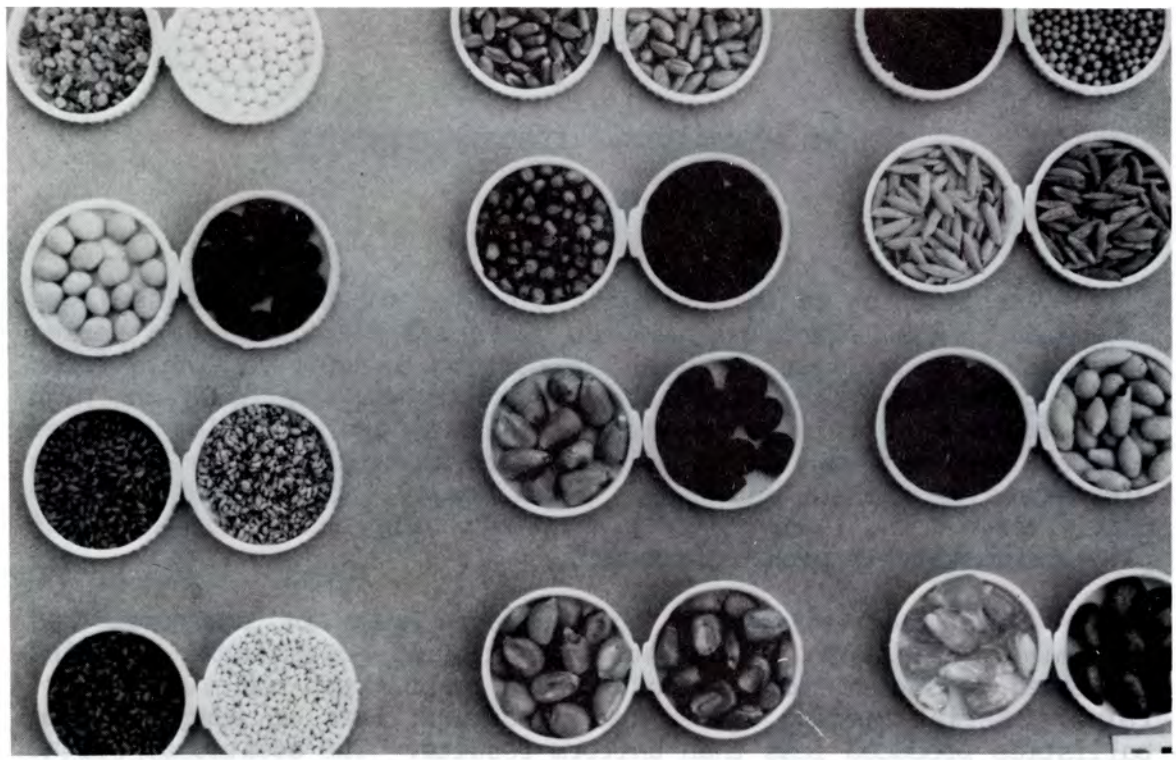

Coated and uncoated seed of various field and vegetable crop seed.

Differential seedling growth of maize resulting from coating (R) and not coating (L) seed before planting.

A variety of binders have been utilized. Certain solvent-binders or adhesive solutions have generated difficulties, but no generalized basis for exclusion of binder ingredients is certain. Important binder characteristics include gas and moisture permeability, relatively facile divestment of the pellet and a bio-degradable nature. This usage has been more predicted on availability and the non-toxic character expected than on utilization of the bio-degradable feature for timed release of the seed from the coat or pellet.

Seed coating and pelleting combinations of nutrients, fungicides, herbicides, buffering compounds and microorganisms contribute to major agronomic, horticultural and ornamental species. Coating and pelleting enables seed to germinate and emerge under less than ideal seed bed and soil moisture conditions. Coatings, especially containing fungicides, significantly enhance both percentage of seedling emergence and plant survival when compared with non-coated seed in field soils ranging in pH from 4.8 to 8.1. Coated seed generally consist by weight of one third coating material and two thirds seed. Pelleted seed may range as high as 50 parts pelleting material to one part seed.

Coated seed is a superior method of inoculation for legume seed. Coating provides 1) a substrate to carry very high numbers of rhizobia per seed, 2) a protective environment until conditions are suitable to support germination and nodulation and 3) a controlled method to match select strains of Rhizobium spp. for particular variety X environmental interactions. Nodulation of coated seed has been shown by university researchers to remain significantly higher over time than non-coated, pre-inoculated seed.

Incorporation of herbicides into both seed coatings and seed pellets has encountered limited success. Herbicide coating/pelleting appears to be most effective when the seed bed is finely prepared, soil moisture is slightly under field capacity and soil temperatures permit rapid seedling emergence. However, storage of herbicide coated/pelleted seed under typical warehouse conditions has been shown to be lethal to sensitive seed species.