



An Ecological Friendly Dragee Technic Application on Crop Seeds

Dr. M. László PhD

RISSAC-HAS, Agrochemistry, Budapest, Hungary (marton@rissac.hu, +36 1 3558491)

Summary: In Brazil, in EMBRAPA/CNPH was developing a dragee technic for seeds of crops and vegetables of carrot (*Daucus carota L.*), onion (*Allium cepa L.*), tomato (*Lycopersicum esculentum Mill.*), lettuce (*Lactuca sativa L.*), micro tubers of potato (*Solanum tuberosum L.*), *Andropogon* ssp. and *Eucalyptus* ssp. using as inert material the dolomite (CaCO_3 96%) powder fractions (0.05 to 1.00 mm) and as cementing adhesives the polyvinyl acetate (PVA) and Gumma arabicum (Ga) (0 to 80% in water). On dragee process were using fungicides with agent of metalaxyl, iprodyon, benomyl, mankoceb (1 to 5 g fungicide/kg dolomite powder) and nutrients (N, P₂O₅, K₂O 0.05 to 0.5, MgO, Fe, Zn, Mn, B, Cu, Mo, Co 0.000005 to 0.1 g/kg dolomite powder) were applied from 1990. to 1993. Best results obtained with fraction of dolomite powder of 0.07 to 0.60 mm of diameter and adhesive of polyvinyl acetate (PVA) with the concentration between 10 to 20%. The dragees obtained presented a mechanical resistance of 0.5 kg/cm² had show a germination higher than 90% without any phytotoxic effects to the seedlings. Fungicides with agent of metalaxyl, iprodyon, benomyl, mankoceb with the concentration 3-3 and mineral nutrients N, P₂O₅, K₂O, MgO, Fe, Zn, Mn, B, Cu, Mo, Co with the concentration 0.2, 0.1, 0.15, 0.06, 0.00045, 0.00025, 0.0011, 0.00057, 0.00045, 0.000084, 0.00001 g/kg dolomite powder were showed best reultes, respectively. With this dragee utilization we could make possible the intensive use of highest quality seeds which because of their higher costs are prohibitive in the actual systems of production.

Keywords: crops, vegetables, seeds, dragee, nutrients, fungicides

Introduction: In Latin America, Brazil is the far greatest producer of crops and vegetables, with an annual production estimated at 9.631.000 tons in the value of 1.576 million dollars. Fifty species are cultivated of which 35 are producing botanical seeds including 162 varieties commercialized. The average national production of vegetable seeds is of 1.329,73 tons per year with an additional importation of 553,14 tons (Warley and Homero 1991). Most of the seeds of species are small requiring special preparation of the soil or the formation of seedlings and transplantation limiting the possibilities to mechanized planting. Besides the small size of seeds their trichome contents their wrinkle and their sensibility to mechanical damage difficult their uniform and precise distribution at sowing. To avoid error of "stand" and excessive number of seeds is sown followed by thinning out to eliminate exceeding plants. That results in the rise of production costs leding the producer to the utilization of cheaper seeds giving up extra gains that may results from the usage of better cultivars. The dragee facilitates the uniform distribution of seeds and makes precision mechanical planting possible (Márton 1993). In the process of plant productions the use of drageed seeds facilitates the distribution of seeds that rises productive rentability (Silva and Márton 1992). The National Research Center for Vegetable Crops was developing dragee techniques of seeds based on Hungarian technology viewing the utilization of natural resources from the Brazilian situation from 1990 to 1993 (Márton 1999, 2000).

Material and Method: At the first stage an equipment was developed for the production of dragees on the laboratory scale. The apparatus was permitting different material tests of seeds of various species obtaining dragees of carrot (*Daucus carota L.*), onion (*Allium cepa L.*), tomato (*Lycopersicum esculentum Mill.*), lettuce (*Lactuca sativa L.*) and micro tubers of potato (*Solanum tuberosum L.*), *Andropogon* ssp. and *Eucalyptus* ssp. using as inert material the dolomite (CaCO_3 96%) powder fractions (0.05 to 1.00 mm) and as cementing adhesives the polyvinyl acetate (PVA) and Gumma arabicum (Ga) (0 to 80% in water). On dragee process were using fungicides with agent of metalaxyl, iprodyon, benomyl, mankoceb (1 to 5 g fungicide/kg dolomite powder) and mineral nutrients (N, P₂O₅, K₂O 0.05 to 0.5, MgO, Fe, Zn, Mn, B, Cu, Mo, Co 0.000005 to 0.1 g/kg dolomite

powder) were applied from 1990. to 1993. After the first stage of producing dragées a more detailed study was started to produce seeds of tomato varieties for processing being its mechanical seeding the most wide-spread requiring 40.000 tons of seeds per year.

Results and Discussion: During the tests with the dragées produced it was verified that those produced from materials of very fine granulometry affected very adversely the germination of the seeds probably because of the lack of gas diffusion. This phenomenon was due to the formation of micro pores that retained water with great intensity not permitting gas exchange between the seeds and environment. At the same time it was observed different that greater fractions of material do not permit the adhesion of seeds and the dragée remained "empty". The tests of granulometric fractions of dolomite powder showed that granule with size over 0.6 mm is not practicable for dragée process because of the lack of sticking of the seeds and because of the formation of deformed dragées the surface of which is not smooth. Best results were obtained in the intermediary fractions of 0.07 to 0.60 mm when the finer fractions were usable in the final stage in order to obtain smoother surface. When granules finer than 0.07 mm were used this affected adversely the germination of the seeds. As cementing agents adhesives of polyvinyl acetate (PVA) and Gumma arabicum (Ga) were tested in concentrations between 5 to 70% diluted in water. Best results were obtained with PVA with the concentration between 10 to 20%. The dragées produced with adhesives at 5% obtained a mechanical resistance inferior to 0.5 kg/cm² and the dragées produced easily. The dragées produced with adhesives of concentration superior to 20% presented a mechanical resistance higher than 0.5 kg/cm² but difficulted the germination.

The affinity of contact between the layer of dragée and surface of the seeds is favorable to the formation of a water coat. That coat does not permit the oxygenation of the seeds unable the beginning of the germination. Because of that during the first day after the planting the formation of the water coat layer must be avoided the application of irrigation. Best results with fungicides with agents such metalaxyl, iprodion, benomyl, mancozeb with the concentration 3-3 and mineral nutrients such N, P₂O₅, K₂O, MgO, Fe, Zn, Mn, B, Cu, Mo, Co with the concentration 0.2, 0.1, 0.15, 0.06, 0.00045, 0.00025, 0.0011, 0.00057, 0.00045, 0.000084 0.00001 g/kg dolomite powder were obtained, respectively. With this fungicides and mineral nutrients concentrations were obtaining very good germinations (higher than 90%) without surging phytotoxication and other abnormalities. In case of this dragée utilization can make possible the intensive use of highest quality seeds which because of their higher costs are prohibitive in the actual system of production by mechanical seeding, generally. For example actually 2 to 3 kgs of tomato seeds are used per hectare for planting. However 0.2 to 0.3 kgs of seeds should be sufficient to produce the seedlings to the same area.

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