A Different Way to Sow: Seed Enhancements Involving Gelatin Encapsulation

Study Overview *A summary of research published in Agrochemicals (2025) investigating the use of gelatin capsules to deliver high volumes of controlled-release fertilizers to tomato seeds.*

Study Goal

In 2025, researchers conducted a study to see if using gelatin capsules could effectively deliver much larger amounts of fertilizer directly with the seed without harming it. While traditional seed coatings can only hold small amounts of additives (often less than 10% of the seed's weight), capsules offer much more space.

The goal was to test if encapsulating tomato seeds with up to **1,600 mg** of slow-release fertilizer would improve plant growth and speed up flowering, or if such high amounts would damage the young plants (a problem known as "phytotoxicity").

Key Findings

1. Handling High Fertilizer Volumes

The study tested capsules containing 8, 16, and even 32 prills (beads) of fertilizer.

- **Safety Confirmed:** Despite being planted with large amounts of fertilizer right next to the seed, the plants did not suffer from chemical burns or toxicity.
- **Germination:** There was a short delay in sprouting (about 1 to 2 days) as the capsule dissolved, but this did not negatively affect the final number of plants that grew.

2. Significant Growth Gains

The plants grown from the fertilizer-filled capsules showed dramatic improvements compared to normal control plants.

- **Taller Plants:** By the end of the study, plants from the high-fertilizer capsules were **75.5% taller** than the standard plants.
- **More Biomass:** The total weight (biomass) of the plants increased massively. Plants from the 32-prill capsules had nearly **460% more root mass** and significantly more shoot mass than the controls.

3. Accelerated Flowering

One of the most exciting findings was how the capsules affected the plant's timeline.

- **Earlier Blooms:** Plants grown with higher amounts of encapsulated fertilizer (16 or 32 prills) began flowering up to **3 weeks earlier** than the control plants.
- **More Flowers:** By week 9, **70%** of the capsule-grown plants had flowered, while only **10%** of the standard plants had produced flowers.

4. Why This Matters

This study proves that capsules can solve a major problem with traditional seed coatings: volume.

- **Volume Advantage:** Because capsules have empty space inside, they can hold far more beneficial nutrients than a thin coating ever could.
- **Efficiency:** This method delivers a large, steady supply of nutrients directly to the plant's roots, potentially reducing the need for farmers to spread fertilizer across entire fields, which saves money and reduces runoff.

Conclusion

The study concludes that encapsulating seeds with controlled-release fertilizers is a safe and highly effective way to boost plant performance. It allows for "micro-dosing" large amounts of nutrients directly to the seed, resulting in much larger plants and significantly earlier flowering, all while minimizing the risk of environmental pollution.

Works Cited

Touchette, B. W., Cox, D. S., Carranza, R. L., & Palms, H. (2025). A different way to sow: Seed enhancements involving gelatin encapsulation with controlled-released fertilizers improve seedling growth in tomato (*Solanum lycopersicum* L.). *Agrochemicals*, *4*(1), 2. https://doi.org/10.3390/agrochemicals4010002