**Supplementary Materials:**

**Table S1.** Materials used to produce urea slow-release nitrogen (USRN) fertilizers and their methods.

| No. | Material | Method | Title | Year | Ref. |
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| 1 | Hydroxy Propyl Methyl Cellulose, Polyvinyl Alcohol, Glycerol, and Blended Paper. | Chemical Reaction | Synthesis and Characterization of Slow-Release Fertilizer Hydrogel Based on Hydroxy Propyl Methyl Cellulose, Polyvinyl Alcohol, Glycerol, and Blended Paper. | 2021 | [27] |
| 2 | Calcium carbonate formaldehyde | Chemical Reaction | Calcium carbonate modified urea-formaldehyde resin adhesive for strength enhanced medium density fiberboard production | 2021 | [108] |
| 3 | Chitosan, Humic Acid,silica compound | Chemical Reaction | Review: Synthesis of Urea in Several Methods | 2021 | [52] |
| 4 | Gypsum and gyp drywall waste cocrystals | Mechanosynthesis | Mechanochemically synthesized gypsum and gypsum drywall waste cocrystals with urea for enhanced environmental sustainability fertilizers. | 2020 | [109] |
| 5 | Polyester | Granulation | Degradable polyester/urea inclusion complex applied as a facile and environment-friendly strategy for slow-release fertilizer: Performance and mechanism | 2020 | [110] |
| 6 | Silica | Chemical Reaction | Urea-silica nanohybrids with potential applications for slow and precise release of nitrogen | 2020 | [111] |
| 7 | Hydroxyapatite | Chemical Reaction | Urea-Hydroxyapatite Nanohybrids for Slow Release of Nitrogen | 2019 | [112] |
| 8 | Humic Acids | Chemical Reaction | The use of humic acid urea fertilizer for increasing yield and utilization of nitrogen in sweet potato | 2017 | [113] |
| 9 | Brown Coal | Granulation | Hybrid brown coal-urea fertilizer reduces nitrogen loss compared to urea alone | 2017 | [114] |
| 10 | | | A slow-release nitrogen fertilizer produced by simultaneous granulation and superheated steam drying of urea with brown coal | 2016 | [115] |

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| 11 | Boric acid-modified starch polyvinyl alcohol | Chemical Reaction | Boric acid modified starch polyvinyl alcohol matrix for slow-release fertilizer. | 2016 | [42] |
| 12 | Urea-formaldehyde | Chemical Reaction | Slow-release fertilizers based on urea/urea–formaldehyde polymer nanocomposites | 2016 | [40] |
| 13 | Clay | Physical granulation | Synthesis of highly intercalated urea-clay nanocomposite via domestic montmorillonite as eco-friendly slow-release fertilizer | 2016 | [116] |
| 14 | Cellulose | Chemical Reaction | A novel wheat straw cellulose-based semi-IPNs superabsorbent with integration of water-retaining and controlled-release fertilizers | 2015 | [117] |
| 15 | Starch + Lignin | Chemically modified | Improvement of Hydrophobicity of Urea Modified Tapioca Starch Film with Lignin for Slow Release Fertilizer. | 2013 | [118] |
| 16 | Bentonite | Chemical Reaction | A novel slow-release urea fertilizer: Physical and chemical analysis of its structure and study of its release mechanism | 2013 | [119] |
| 17 | Phosphogypsum | Chemical Reaction | Production technology of nitrogen-sulfur-calcium fertilizers on the base of urea and phosphogypsum | 2012 | [38] |
| 18 | Hydroxyapatite | Chemical Reaction | A green slow-release fertilizer composition based on urea-modified-hydroxyapatite nanoparticles encapsulated wood | 2011 | [57] |
| 19 | Attapulgite (APT) | Physical granulation | Environmentally Friendly Slow-Release Nitrogen Fertilizer | 2011 | [120] |
| 20 | calcium sulfate | Chemical Reaction | Preparation methods of calcium sulfate and urea adduct | 2007 | [37] |