

BAB V

KESIMPULAN DAN SARAN

5.1 Kesimpulan

1. Kopolimer dengan rasio AM dan AM 1:1 akan dapat menyimpan urea dengan jumlah yang lebih banyak dibanding dengan kopolimer dengan rasio AA dan AM 0 :1
2. Kopolimer dengan rasio AA dan AM 1:1 dan rasio pati : urea 1:2 akan memiliki laju pelepasan urea yang paling besar dibandingkan dengan variabel lain
3. Kopolimer dengan rasio pati dan urea 1:2 akan dapat men-*graft* urea dengan jumlah lebih banyak dibanding kopolimer dengan rasio pati dan urea 1:0,5 dan 1:1

5.2 Saran

Dari penelitian yang sudah dilakukan, diperoleh beberapa kekurangan yang dituangkan menjadi saran kepada peneliti selanjutnya, sebagai berikut :

1. Melakukan analisa pelepasan urea dalam media air yang lebih banyak
2. Melakukan pembuatan kopolimer dengan rasio AA dan AM 1:0
3. Melakukan pembuatan kopolimer dengan rasio urea lebih besar

DAFTAR PUSTAKA

- Azeem, B., KuShaari, K., Man, Z.B., Basit, A., Thanh, T.H., 2014 “*Review on Materials & Methods to Produce Controlled Release Coated Urea Fertilizer.*” *Journal of Controlled Release*. 181(1):13-14
- Blair T.A., Ransom C.J., Jolley V.D., Sutton L.E., Hopkins B.G. 2020 “*Nitrogen Release Rates from Slow And Controlled Release Fertilizers Influenced by Placement and Temperature.*” *PLoS ONE*. 15
- Bonnet, F.; Meimoun, J.; Wiatz, V.; Saint-Loup, R.; Julien Parcq, J.; Audrey Favrelle, A.; Zinck, P. 2018, “*Modification of starch by graft copolymerization*”. *Starch/Stärke* 70.
- Bruneel, C., Delcour, J.A., Derde, L.J., Gomand, S.V., Pareyt, B., Putseys, J.A., Wilderjans, E., and Lamberts, L. 2010, “*Fate of Starch in Food Processing: From Raw Materials to Final Food Products.*” *Annual Review of Food Science and Technology* 1(1):87-111
- Chen, S., Han, X., Hu, X. 2008. “*Controlled-release Fertilizer Encapsulated by Starch/Polyvinyl Alcohol Coating.*” *Desalination* 240: 21-26, Elsevier
- Cindy, Hardja, S., Santoso, H., Witono, J.R., 2017. “*Synthesis of Controlled Release of Fertilizer with Encapsulation Method (Polyethylen Glycol, Acetic Anhidrate and Canna Starch)*”. Laporan Penelitian, Universitas Katolik Parahyangan. Bandung. Indonesia.
- Denisov, E.T., Pozdeeva, N.N; 2011. “*Mechanism of Hydroquinone-Inhibited Oxidation of Acrylic Acid and Methyl Methacrylate*”. *Kinetics and Catalysts*
- Dkhar, L.K; Fatihhi, S.J; Sennakesavan, G; Mostakhdemin, M; Seyfoddin, A., 2020. “*Acrylic Acid/Acrylamide Based Hydrogels and Its Properties - A Review*”, *Polymer Degradation and Stability*
- Herlambang, M., 2020. “*Pengembangan Metode Dispersi Pada Kopolimer Controlled Release Fertilizer*”. Laporan Penelitian, Universitas Katolik Parahyangan. Bandung. Indonesia.
- Hojjatie, M. 2020 “*Review of Analytical Methods for Slow and Controlled Release Fertilizers*”, *International Fertilizer Association*

Irawan, Setyorini, D., Rochayati, S., 2012. "Proyeksi Kebutuhan Pupuk Sektor Pertanian Melalui Pendekatan Sistem Dinamis." Litbang Pertanian di Balai Penelitian Tanah

Jyothi, A.N. 2010, "Starch Graft Copolymers: Novel Applications in Industry." *Compos. Interfaces* . 17, 165–174.

Laycock, B., Luckman, P., Siyamak, S., 2019. "Synthesis of Starch Graft-Copolymers via Reactive Extrusion: Process Development and Structural Analysis". *Carbohydrate Polymers*

Leeder, J. & Watt, I. (1968). "Role of Carboxyl Groups in Water Absorption by Keratin" *Journal of Applied Chemistry, Journal of Applied Chemistry*

Li, H., Niu, Y. 2012. "Controlled Release of Urea Encapsulated by Starch-g-poly(vinyl acetate)", *Industrial & Engineering Chemistry Research* 51(38):12173–12177

Lubkowski K. 2017. "Fertilizers With A Delayed Nutrient Release." Paper, West Pomeranian University of Technology, Szczecin, Poland

Nawaz, H; Nawaz, M; Shawar, D; Waheed, R., 2020. "Physical and Chemical Modifications in Starch Structure and Reactivity", dalam M. Emeje (Ed.). *Chemical Properties of Starch*. Intechopen. 1-8

Ottenhof, Marie-Astrid & Farhat, Imad A., 2004. "Starch Retrogradation", *Biotechnology and Genetic Engineering Reviews*, 21:1, 215-228

Patidar, K.K., 2016. "Principles and Procedures Involved in Usage of Reagents in Pharmaceutical Analysis", *ISF College of Pharmacy, SlideShare*

Pither, R.J., 2003. "Encyclopedia of Food Sciences and Nutrition (Second Edition)", 5561-5583

Pratama, E.E., Witono, J.R, 2016. "Sintesa Grafting Dengan Variasi Monomer Dalam Pembuatan Controlled Release Fertilizer." Laporan Penelitian, Universitas Katolik Parahyangan. Bandung. Indonesia.

Rajan M, Shahena S, Chandran V, Mathew L. 2021 "Controlled release of fertilizers—concept, reality, and mechanism". dalam *Controlled Release Fertilizers for Sustainable Agriculture*. Elsevier; 41-56.

Sabry, K.H.,2015 “*Synthetic Fertilizers; Role and Hazards*” dalam S.Shinha (Ed.). *Fertilizer Technology I : Synthesis* 1(7):176-199

Shavit U, Shaviv A, Zaslavsky D.1995 “*Controlled Release Solute Diffusion Coefficient in the Internal Medium of a New Gel Based Controlled Release Fertilizer.*” dalam *Journal of Controlled Release* 37

Shaviv A. 2005 “*Controlled Release Fertilizer.*” *FA International Workshop: Enhanced-Efficiency Fertilizers*, Frankfurt

Shaviv A. 2001 “*Advances in Controlled-Release Fertilizers*”. *Advances in Agronomy* 71:1-49.

Suhendar, B.Y.,2019.”Pengendalian Laju Pelepasan Pupuk Pada *Controlled Release Fertilizer* Melalui Variasi Jenis *Crosslinker* dan Jumlah Pupuk yang Di-*Grafting*.”Laporan Penelitian, Universitas Katolik Parahyangan. Bandung. Indonesia.

Trenkel, M.E.,2010 “*Slow and Controlled-Release and Stabilized Fertilizers : An Option for Enhancing Nutrient Use Efficiency in Agriculture.*”International Fertilizer Industry Association.

Trenkel, M.E., 1992. “*Controlled release and Stabilized Fertilisers in Agriculture*”. IFA,Paris

Tjitrajaya, Y.A., 2017. “*Sintesis Absorbent Pad* dari Pati Ganyong dengan Menggunakan Natrium Bikarbonat (NaHCO_3) sebagai *Foaming Agent*”, Laporan Penelitian, Universitas Katolik Parahyangan. Bandung. Indonesia.

Wang, S ; Li, C ; Copeland, L.; Niu,Q;Wang,S., 2015. “*Starch Retrogradation: A Comprehensive Review*”. *Comprehensive Reviews in Food Science and Food Safety*, 14(5), p. 568–585

Wijaya, L.,2014.” Pengembangan *Controlled-Release Fertilizer* Berbasis Pati Ganyong.” Laporan Penelitian, Universitas Katolik Parahyangan. Bandung. Indonesia.

Witono, J.R.; Noordergraaf, I.W.; Heeres, H.J.;Janssen,L.P.B.M.2012,”*Graft Copolymerization of Acrylic Acid to Cassava Starch—Evaluation of the Influences of Process Parameters by an Experimental Design Method*”. *Carbohydr. Polym.* 90, 1522–1529.

Witono, J.R.; Marsman, J.H.; Noordergraaf, I.W.; Heeres, H.J.; Janssen, L.P.B.M. 2013, *“Improved homopolymer separation to enable the application of ¹H-NMR and HPLC for the determination of the reaction parameters in de graft copolymerization of acrylic acid onto starch.”* Carbohydr. Res. 370, 38–45