

**KARAKTERISTIK FISIK EKSTRUDAT DENGAN PERLAKUAN
PENAMBAHAN TEPUNG KANGKUNG PADA GRIT JAGUNG
DAN KADAR AIR AWAL BAHAN MENGGUNAKAN
EKSTRUDER ULIR GANDA**

INTISARI

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Makanan ringan berbasis jagung melalui teknologi ekstrusi memiliki potensi pasar yang besar di Indonesia, namun kandungan nutrisinya masih terbatas. Kangkung merupakan sayuran lokal kaya serat dan mineral yang berpotensi difortifikasi ke dalam ekstrudat jagung untuk meningkatkan nilai gizi. Penelitian ini bertujuan untuk mengetahui adanya pengaruh komposisi tepung kangkung dan kadar air awal bahan terhadap karakteristik fisik ekstrudat untuk menghasilkan makanan ringan kaya nutrisi. Ekstrudat dihasilkan menggunakan mesin ekstruder SYSLG-IV *twin-screw extruder*. Penelitian dilakukan dengan menggunakan metode Rancangan Acak Lengkap (RAL) yang terdiri atas dua faktor, yaitu komposisi penambahan tepung kangkung (0%, 5%, 10%, dan 15%) dan kadar air awal campuran (12%, 14%, 16%). Karakteristik fisik ekstrudat yang dianalisis berupa, kadar air, rasio ekspansi, *particle density*, *bulk density*, kekerasan, *water absorption index* (WAI), *water solubility index* (WSI), dan warna (*lightness*, *redness*, dan *yellowness*). Hasil penelitian menunjukkan bahwa penambahan komposisi tepung kangkung dan peningkatan kadar air awal berpengaruh signifikan ($p < 0,05$) dalam meningkatkan kadar air, *particle density*, *bulk density*, dan kekerasan, serta menurunkan rasio ekspansi, WAI, WSI, *lightness*, *redness*, dan *yellowness* ekstrudat baik pada saat sebelum maupun setelah dikeringkan. Akan tetapi, perlakuan tersebut belum dapat menghasilkan ekstrudat dengan karakteristik fisik yang baik. Berdasarkan analisis *Technique for Order Preference by Similarity to Ideal Solution* (TOPSIS), kombinasi perlakuan dengan preferensi terbaik diperoleh pada perlakuan penambahan tepung kangkung 0% dengan kadar air awal bahan sebesar 12%.

Kata kunci : grit jagung, tepung kangkung, ekstrusi, sifat fisik, ekstruder ulir ganda

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**PHYSICAL CHARACTERISTICS OF EXTRUDATES WITH
TREATMENT OF WATER SPINACH POWDER ADDITION TO
CORN GRITS AND INITIAL MOISTURE CONTENT USING
TWIN SCREW EXTRUDER**

ABSTRACT

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Corn based snacks produced through extrusion technology have significant market potential in Indonesia, but their nutritional content remains limited. Water spinach is a local vegetable rich in fiber and minerals, offering potential for fortification into corn extrudates to enhance their nutritional value. This study aims to examine the effect of water spinach powder composition and initial moisture content on the physical characteristics of extrudates to produce nutrient-rich snacks. The extrudates were produced using a SYSLG-IV twin screw extruder. The research employed a Completely Randomized Design (CRD) with two factors: the addition of water spinach powder (0%, 5%, 10%, and 15%) and the initial moisture content of the mixture (12%, 14%, 16%). The analyzed physical characteristics of the extrudates included moisture content, expansion ratio, particle density, bulk density, hardness, water absorption index (WAI), water solubility index (WSI), and color (lightness, redness, yellowness). The results showed that increasing the water spinach powder composition and initial moisture content significantly ($p < 0.05$) increased the moisture content, particle density, bulk density, and hardness while reducing the expansion ratio, WAI, WSI, lightness, redness, and yellowness of the extrudates, both before and after drying. However, these treatments failed to produce extrudates with optimal physical characteristics. Based on the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) analysis, the best-performing treatment combination was 0% water spinach powder with an initial moisture content of 12%.

Keywords : corn grits, water spinach powder, extrusion, physical properties, twin screw extruder

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