

**DEVELOPMENT OF FUEL-POWERED PRESSURE COMPENSATED PUMP  
WITH AUTOMATED ELECTROMAGNETIC CLUTCH AND  
VARIABLE THROTTLE CONTROL SYSTEM**

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## ABSTRACT

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This study addresses the challenges faced by farmers utilizing drip irrigation systems, including significant fuel consumption, high capital expenditures, rising fuel prices, and limited electricity supply in remote agricultural areas. To tackle these issues, the study focuses on the development, fabrication, and evaluation of a fuel-powered pressure-compensated pump equipped with an automated electromagnetic clutch and variable throttle control system. The machine is designed using locally available materials and manufacturing technologies, comprising components such as a gasoline engine, water pump, electromagnetic clutch, microcontroller assembly, and frame assembly. It has an overall dimension of 750mm x 410mm x 805.60mm (L x W x H). Results show that the pressure was maintained at  $20.004 \pm 0.82$  *psi*,  $30.22 \pm 1.37$  *psi*, and  $39.7427 \pm 3.10$  *psi*. The study analyzes the fuel consumption of both the automated and conventional systems at different pressure levels, revealing that the highest fuel consumption occurs at 40 PSI (13.73 mL/min for the automated system and 16.9 mL/min for the conventional system), while the lowest consumption is observed at 20 PSI (7.26 mL/min for the automated system and 15.07 mL/min for the conventional system). It also found that the

maintaining pressure 30 psi generally exhibits better water flow rate compared to 20 psi and 40 psi. An income of Php 22,963.89/year can be generated using the machine with a payback period of 1.93 years.

Keywords: automation; PID; pressure compensated; fuel consumption; drip irrigation;

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