# ABSTRACT

Pesticide spraying is one of the important activities in crop maintenance. However, the use of manual sprayers requires repeated pumping, which can cause operator fatigue and make the spraying process less practical. Meanwhile, sprayers powered by electricity or fuel require additional energy sources and higher operating costs. Based on these problems, this study aimed to manufacture a wheel-rotation-based pesticide sprayer that utilizes mechanical energy from the operator's pushing motion to drive the pump, allowing the pump to operate without electricity or fuel.

The method used in this study was a *manufacturing process* consisting of data collection, concept planning, material and equipment selection, manufacturing, assembly, finishing, and performance testing. The sprayer frame was manufactured using low-carbon steel hollow sections measuring 30 × 30 × 1.2 mm. The pump driving system used a chain and sprocket transmission with a 22T driving sprocket and a 32T driven sprocket. The working principle of the sprayer begins with the rotation of the wheel caused by the operator's pushing motion. The rotation is transmitted through the chain and sprocket system to the crank mechanism and converted into reciprocating motion to drive the piston pump, which then delivers the liquid to the nozzle. The manufactured sprayer has an overall length of 1360 mm, width of 500 mm, maximum height of 1300 mm, handle height of 950 mm, and tank capacity of 18 liters.

The test results showed that the sprayer was able to operate mechanically while being pushed by the operator. In the first test, the sprayer covered a distance of 210 meters in 305 seconds, with an average speed of 0.7 m/s, producing 128 pump strokes and an average flow rate of 3.54 L/min. In the second test, the sprayer covered the same distance in 405 seconds, with an average speed of 0.5 m/s, producing 115 pump strokes and an average flow rate of 2.67 L/min. These results indicate that changes in pushing speed affect the pump operating frequency and flow rate, while the transmission system was still able to transfer wheel rotation to the pump and maintain the spraying process. The total manufacturing cost was Rp2,000,000, including materials, mechanical components, supporting components, and production services. Based on the test results, the manufactured wheel-rotation-based pesticide sprayer was able to perform its main function as a spraying device by utilizing mechanical energy from the operator's pushing motion without relying on electricity or fuel.



**Keywords:** sprayer, rotation, pump, transmission, manufacturing.