Journal of Agriculture and Agricultural Technology
(JAAT)
Journal of Agriculture and Agricultural Technology 14 (1), 2025

DEVELOPMENT AND TESTING OF A HOMESTEAD SOLAR-POWERED FISH FEED PELLET DRYER

ADEBAYO[1]* S. E., MOHAMMED[1], A. S. BAKE[2], G. G. MOHAMMED[1], I. S. LAWAL,[2] M. AND MUHAMMADU,[3] M. M.

[1]Department of Agricultural and Bioresources Engineering, Federal University of Technology Minna, Niger State.

[2]Department of Water Resources, Aquaculture and Fisheries Technology, Federal University of Technology Minna, Niger State.

[3]Department of Mechanical Engineering, Federal University of Technology Minna, Niger State.

***Corresponding Author email:** segun.emma@futminna.edu.ng

ABSTRACT

A homestead solar-powered feed pellet dryer was developed and tested at the old teaching and research farm in the Water Resources Department of Aquaculture and Fisheries Technology at the Federal University of Technology, Minna, to alleviate problems associated with the traditional method of drying in Nigeria. The machine consists of six main parts (base, drying chamber, slide-out trays, 110-watt fan, door, and solar power system). Performance evaluation was conducted on the dryer to assess the moisture content and drying rate of the pellets. Three kg of pellets with an initial percentage moisture content (%MC) of 28.62 % were used to test the dryer using the first three layers with 1 kg of the pellets evenly spread on the 1st, 2nd, and 3rd trays at air velocities of 6.0 m/s, 2.7 m/s, and 0.5 m/s, respectively, and at a temperature range of 28-31°C. The results disclosed that the % MC of the pellets was reduced to 8.62 %, 11.32 %, and 15.02 %, while the drying rate at constant rate period decreased from 0.125 g/hr to 0.094 g/hr, and 0.072 g/hr, in the 1st, 2nd, and 3rd trays, respectively, after six hours of drying. Overall, the dryer was effective in drying pellets to a safe moisture level.

Keywords: aquaculture, drying, performance evaluation, drying efficiency, dryer.

INTRODUCTION

Nigeria ranks among the world's leading producers and consumers of fish, with an annual demand of approximately 2.1 million metric tons. However, local production remains at around 800,000