EcoProtein: 3 Problems, 1 Solution

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A large amount of organic waste is accumulated all over the world, which is not used efficiently. The most suitable way for waste recycling is using microorganisms such as yeast for producing single cell protein. Saccharomyces cerevisiae ATCC 9804 was grown aerobically at 30 °C, pH7 in 2-10 % fruit (bananas, orange, kiwi, apple) or vegetable (beet, potato, carrot, cabbage, parsley) wastes medium. Preliminary treatment such as hydrolysis at 120°C for 45 min with or without 0.75% H_2SO_4 was applied. 3% night culture grown in the YPD medium was used as an inoculum. Growth was estimated by measuring optical densities (OD600). Growth yield was stated as the difference of maximum and initial biomass by using biomass-OD standard curve and protein determination was performed using the Kjeldahl method. Results showed that treatment with H_2SO_4 is not effective: in samples treated with H_2SO_4, an increase in concentration leads to growth inhibition and a higher biomass formation was observed in 2% wastes medium, which is 1.1 fold lower compared to the growth in wastes medium treated without acid hydrolysis. This may be because of decrease in nitrogen concentration and growth inhibitory effect of H_2SO_4. The highest biomass (OD600=2.54, 28.30 g/l dry weight) was obtained in 10% vegetable waste containing medium. At 24h of growth nitrogen concentration was 42% and 52.5%, from which 26.25% and 32.81% are crude protein in fruit and vegetable wastes respectively. Thus yeast can grow in fruit and vegetable wastes and produce significant biomass after 24h which increases gradually during growth and reaches its maximal value at 120h. Thus from obtained yeast biomass it is possible to separate safe and protein-rich additives that can be used in the production of animal feed.