

EXECUTIVE SUMMARY

TITLE OF PROJECT: Determination of water and nitrogen requirements of processing cauliflower using fertigation

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OBJECTIVES: 1. Determine the optimum quantity of water and nitrogen for fertigated processing cauliflower in Southern Ontario. 2. Evaluate the effect of increasing rates of water and nitrogen on yield, quality, incidence of diseases/disorders, and nitrogen uptake of processing cauliflower.

MATERIALS AND METHODS: Cauliflower (cv Apex) was seeded on June 12 and transplanted on 17 July, 2003. Treatments consisted of 5 rates of nitrogen (0 to 400 kg N ha⁻¹) and 5 target soil moisture values (25 to 100% of field capacity) in specified combinations as required for a central rotatable composite design. Prior to transplanting, 50% of the nitrogen fertilizer for each treatment was applied and the remaining 50% was applied after transplanting through a trickle irrigation system on a weekly basis. Soil moisture content was measured every 2-3 days from planting to harvest and the amount of water required to bring soil moisture up to the target levels was then calculated and applied. Soil samples were collected at various times throughout the growing season and tissue samples were taken at harvest to determine nitrogen content. Petiole sap nitrate-nitrogen content was measured bi-weekly. Plots were harvested 5 times starting Oct. 9 with heads taken when they reached a diameter of 20-25 cm. Heads were graded according to industry standards and ratings were taken to evaluate curd quality.

RESULTS AND DISCUSSION: Yield of marketable (No. 1+ No. 2 grades), No. 1 grade and culls was not affected by total water received due to the almost perfect distribution of rainfall during head formation and expansion. Marketable and No. 1 grade yield increased with nitrogen rate maximum yields of 28, 27 t·ha⁻¹ produced with 319, 395 kg N ha⁻¹ for each grade respectively. Yield of culls decreased with increasing nitrogen to 255 kg N ha⁻¹. Culls were made up of loose, ricey curds, severe black spot, yellow curds, and head rot. The incidence of black spot, yellow curds, and head rot was low and was not affected by the treatments. However, the incidence of loose heads increased proportionately with water received and the incidence of riciness decreased proportionately with increasing nitrogen. Although the total incidence of black spot was unaffected by the treatments, the severity was lessened with high amounts of water and low nitrogen. Curd quality and weight generally increased with increasing nitrogen. "Optimum" amounts of nitrogen found in this study were higher than current OMAF recommendations but these high rates of N may not be economically or environmentally feasible. The interrelationship of nitrogen and water on cauliflower yield is complex and requires further study.