

Study of the respiratory pattern and application of ethylene on post-harvest ripening of chilli (*Capsicum annum* var. MI-2)

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Abstract

Chilli (*Capsicum annum* var. MI-2) pods harvested at different stages of maturity ranging from light green to full red were used to study the respiration changes at 15.5 °C and 83 % RH in a closed system. Respiration rates of chilli from light green to full red stage ranged between 12.7-24.2 mgCO₂/kg/h. The rate of respiration was low (12.7 mgCO₂/kg/h) at light green stage and increased with maturity reaching a peak of 24.2 mgCO₂/kg/h at the stage where a distinct colour change occurs. In the ripening process, at first respiration rate decreases. Then later as the red colour develops, the respiration is shown to increase. Ethylene was present in the pods between 3.2-4.3 ppm. However, there was no ethylene peak observed with the maturity. Fruits were allowed to ripen at ambient conditions (32 ± 2 °C and 37 % RH) with 0, 100, 200, 300, and 400 ppm ethylene concentrations. Observations were made on colour development of pods during storage. Ethylene treatment had no significant effect on colour development of chilli harvested at both mature green and colour break stages of maturity. Results provided that *Capsicum annum* var. MI-2 belongs to non-climacteric group of fruits.

Introduction

Respiratory behavior reflects the changing physiological conditions of fruits and vegetables which are categorized into climacteric or non-climacteric groups. Respiratory pattern of capsicums is somewhat contradictory as it varies with cultivars. Hence, objectives of this study were to determine the postharvest respiratory pattern and to investigate the effect of ethylene application on postharvest ripening of chilli (*Capsicum annum*, var. MI-2).

Materials and methods

Chillies at light green, dark green, break, 30 % red, 70 % red, light red and dark red stages were used for respiration study. Samples were sealed and kept at 15.5 °C and 86 % RH. Gas samples (0.5 ml) were withdrawn from the respiratory bottles at 0, 2, 4, and 6 h intervals. For internal gas analysis, 0.5 ml gas samples were withdrawn from each pod. Gas samples were analyzed using

gas chromatograph. Mature green and colour break stages were used for the ripening study. Samples sealed with 0, 100, 200, 300 and 400 ppm ethylene concentrations for 24 h and then were allowed to ripen in ambient conditions (32 °C and 67 % RH).

Results and discussion

Light green chilli produced lower amount of CO₂ than other stages. The production of CO₂ increased with fruit maturity and comes to a peak of 54.2 mg CO₂/kg/h at the color break stage (Fig.1). When fruits are turning color, CO₂ production decreased gradually and then increased again when they are at red ripe stage. Internal ethylene concentration is slightly high when the fruits are green but not detected at their coloring stages (Fig.2). Exogenous ethylene treatment was not effective in inducing red colour development of chilli fruits under the condition of this study.

Conclusion

In measuring respiration rate by CO₂ emission, it appears Chilli (*Capsicum annum*, MI-2) has climacteric characters. However no ethylene peak was observed for ethylene production within the pods. In addition when ethylene was introduced externally no effect on ripening was shown. Hence we conclude chilli (*Capsicum annum*, MI-2) can be categorized under non-climacteric group.

References

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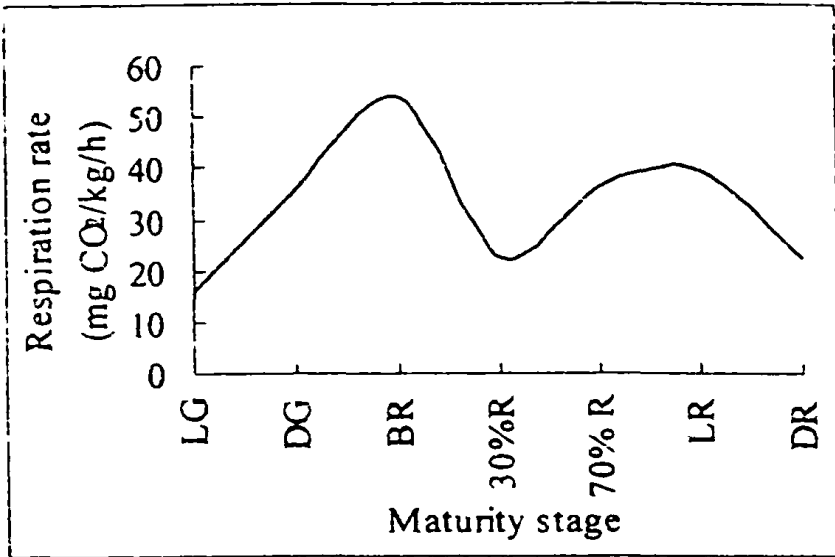


Fig 01: Respiration rate (mg CO₂/ kg of chilli/h) harvested at different maturity stages

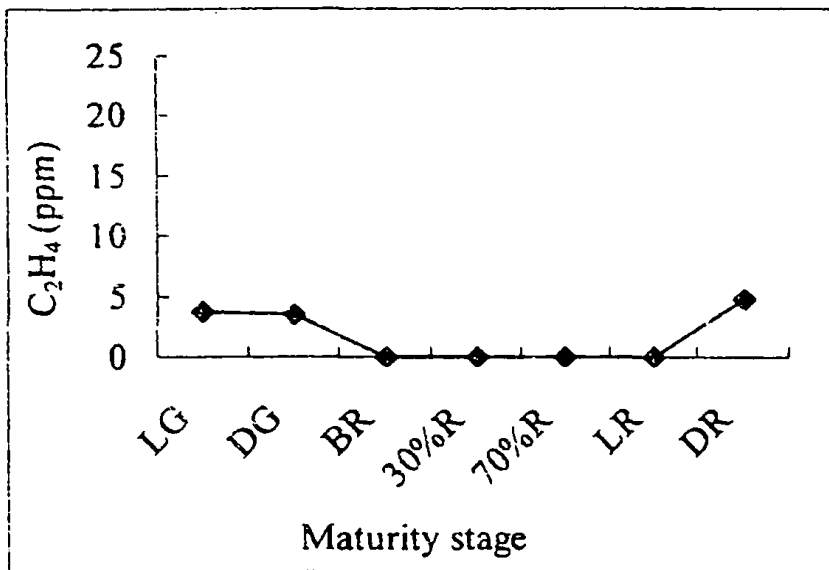


Fig 02: Internal ethylene percentage of pods at different maturity stages