Effect of paclobutrazol on three different aquatic macrophytes under in vitro monoculture or polyculture conditions

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Three aquatic plants, coontail (Ceratophyllum demersum L.), hydrilla [Hydrilla verticillata (L. f.) Royle] and giant duckweed [Spirodela polyrhiza (L.) Schleiden], were successfully surface sterilized and cultured on liquid basal MS (Murashige and Skoog, 1962) medium under aseptic conditions. Shoot explants obtained from these plants were transferred to basal MS medium supplemented with 0, 0.25 and 0.5 mg/l paclobutrazol (PBZ) under in vitro monoculture or polyculture conditions. There were some differences in the patterns of fresh weight increases of the three aquatic plants under monoculture and polyculture conditions. Among the three macrophytes studied, coontail was the most sensitive to 0.25 or 0.5 mg/l PBZ as its fresh weights did not increase at these PBZ concentrations during eight weeks under both monoculture and polyculture conditions. Giant duckweed were relatively more sensitive than hydrilla in response to addition of PBZ to the growth medium under both monoculture or polyculture conditions suggesting that PBZ might not be an effective aquatic pest control agent for hydrilla. The dominance of giant duckweed over hydrilla was effectively overturned with the addition of 0.5 mg/l PBZ to the polyculture medium.

Key words: Aquatic plants, coontail, giant duckweed, hydrilla, plant growth retardant.

INTRODUCTION

Coontail (Ceratophyllum demersum L.) and hydrilla [Hydrilla verticillata (L. f.) Royle] are submersent perennial fresh-water plants that are well known for being used as decoration and oxygen production in a fish aquarium. The giant duckweed [Spirodela polyrhiza (L.) Schleiden] is a free-floating macrophyte found in natural fresh waters. Under natural conditions, these plants provide many beneficial ecological services, but they could also be problematic weedy species; particularly, hydrilla is known to be highly invasive and difficult to control (Sousa, 2011). More research is needed to help better management of these aquatic weedy plants in the natural environments. Gibberellin synthesis inhibitors including paclobutrazol (PBZ) have been suggested as promising herbicides for limiting excessive stem growth of submerged aquatic weeds without reducing plant viability.