

## ABSTRACT

Studies on the autecology and management of *Commelina diffusa* in Fairtrade banana (*Musa* sp.) systems in St. Vincent and the Grenadines

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Banana growers in the Windward Islands are constrained to comply with several regulations as outlined by Fairtrade, EurepGap and Global Gap which seek to drastically reduce agro-chemical use in production systems. Farmers must urgently adopt alternative strategies to control noxious weeds, in particular, *Commelina diffusa* Burm. (water grass) the major weed and nematode host if they are to sustain their export capability. Studies on the autecology and management of *Commelina diffusa* in Fairtrade banana systems in St. Vincent and the Grenadines and in a greenhouse environment were conducted from 2003 to 2006. The overall objective of this research was to identify characteristic traits that regulate the autecology of *Commelina diffusa* in response to various sustainable weed management strategies. The following specific objectives were conducted to:

- 1) Determine the species composition, abundance, stability and diversity of weed communities in banana plantations.
- 2) Compare the demography of *C. diffusa* at a ruderal and a banana orchard habitat.
- 3) Examine the persistence and regrowth characteristics of *C. diffusa* in response to various planting depths under shaded greenhouse conditions and evaluate the response of *Commelina diffusa* to selected control treatments in greenhouse studies.
- 4) Evaluate a range of weed management practices for the control of *Commelina diffusa* in banana.
- 5) (i) Evaluate the Farmer Participatory Research methodology as an approach for mobilizing farmers to solve their weed problems using selected cover crops.  
(ii) Determine the impact of selected cover crops on yield and yield components of banana and their ability to build soil fertility, suppress *C. diffusa* and other weeds and reduce nematode levels.

Weed communities were characterised in major banana growing areas in 25 established banana orchards in St. Vincent and the Grenadines during the 2003-04 wet and dry seasons. A total of 93 weed species were found and most fields had 5 to 15 species. *Commelina diffusa* was the predominant weed in both irrigated and non-irrigated established banana orchards. Seedling establishment appeared to be a factor influencing the dynamics of *C. diffusa* in banana orchards as there was little recruitment of seeds with less flower production compared with ruderal habitats where plants produced more flowers. Plants of *C. diffusa* in the

banana orchard habitat had a longer growth cycle, expressing more of its perennial nature than in the ruderal habitat where more flowers were produced. In the banana orchard habitat, where *C. diffusa* is altered due to weed management measures, populations were higher in mechanical management than in herbicide managed areas.

No regeneration of *C. diffusa* occurred when cut to 2-node, 1-leaf: 1-node, 1-leaf: 0-node and 1-node: 0-leaf pieces. This indicated that the *C. diffusa* can successfully be cut with proper use of a rotary trimmer in banana fields to avoid herbicide use. Results also indicated that *C. diffusa* plants did not regenerate when dried to at least 50 % moisture content and kept in a moisture free environment. Additionally, it was found that with planting depth re-growth was observed at 0 – 7.5 cm depths for sprigged (3-leaf, 2-node) cuttings and from 0 – 2.5 cm depths for 2-node cutting types.

Banana mulch was identified as the best alternative management strategy as it significantly reduced the biomass of *C. diffusa* and other weed species in Fairtrade banana orchards in St. Vincent and the Grenadines. This was followed by Flexstar (fomesafen), coffee hulls, clear plastic mulch and the live mulch, *Desmodium heterocarpon*.

Trials were conducted with thirty-six farmers using Participatory Research and Development methods to evaluate the potential of three cover crops. Results showed that *D. heterocarpon* significantly lowered levels of *C. diffusa* and other weeds ( $p < 0.05$ ).

It is concluded that the most practical management alternatives for *C. diffusa* should include cultural and mechanical not negating the judicious use of herbicides. Such combinations should provide significant management levels of *C. diffusa* for both conventional as well as Fairtrade banana growers.

**Keywords:** Wendy Ann Patrice Isaac; *Commelina diffusa*; Fairtrade; banana orchard; alternative weed management.