

Title: Tolerance of strawberry to indaziflam herbicide applied preplant or postemergence over the top.

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Introduction: North Carolina ranks third after California and Florida in fresh market strawberry production, with a production value of \$27 million from 530 ha planted area in 2016. A plasticulture system is commonly used for strawberry production in NC that includes formation of raised-beds, fumigation, and laying polyethene mulch. Traditionally, MBr was applied in strawberry production to effectively manage soil-borne diseases and pest including weeds. However, the used of MBr was banned in 2005 through the Montreal Protocol and the Clean Air Act due to its harmful effect on ozone depletion in the atmosphere. Currently, a combination of fumigants and preplant, preemergence, and postemergence herbicides along with plastic mulch is used for management of weeds in strawberry. Along with providing good control of broadleaf and grass weeds plastic mulch helps to retain the fumigant, reduces nutrient leaching, and produces a cleaner harvested product.

Henbit, curly dock, geranium, and chickweed are among top ten most common and troublesome weeds present in strawberry production in NC. There are only six PRE herbicides registered for application in plasticulture strawberry beds. The herbicides belong to three modes of action (MOA) including EPTC from group 8, oxyfluorfen, acifluorfen, flumioxazin, and sulfentrazone from group 14 and napropamide from group 15. With the evolution of herbicide resistant weeds, it is important to explore herbicides from another MOA that can be safe to use in strawberry.

Indaziflam (Weed Science Society of America [WSSA] group 29) is a cellulose biosynthesis-inhibitor herbicide belonging to the alkylazine chemical family and has no reported cases of resistant weeds. It is registered for PRE control of annual broadleaf and grass weeds in citrus, stone, and pome fruits, grapes, tree nuts, commercial nursery, managed roadsides, noncroplands, railroads/rail yards, and turf. Total seasonal rates for perennial crops range from 50 to 150 g a.i./ha. Indaziflam provides effective PRE control of goosegrass, oxalis, pigweed, bittercress, buckhorn plantain, common chickweed, annual bluegrass, eclipta, and Brazilian pusley. Indaziflam has a longer half-life in soil which is reported >150 days. As a result, indaziflam

provides prolonged residual activity for weed control which may be beneficial in a strawberry crop that is in the field for approximately 7 months.

Although indaziflam has been evaluated in annual crops and turf grass for tolerance the researchers are not aware of any research that has been conducted in annual strawberry to determine the optimum rate of indaziflam herbicide to achieve optimum weed control and crop safety. Therefore, the objectives of this research are to (1) determine the effect of indaziflam on weed control and (2) strawberry tolerance in annual production systems

Materials and Methods: Two separate field studies (tolerance and weed control) were initiated at the Piedmont Research Station in Salisbury NC to evaluate strawberry tolerance and weed control to indaziflam applied PREPLANT after final bed formation but prior to laying plastic mulch and POST at several rates. Treatments included indaziflam PREPLANT at 36.5, 73, 110, and 146 g ai ha⁻¹ at 1 wk before strawberry transplanting, POST application at 36.5 and 73 g ai ha⁻¹ at two application timings. A nontreated (tolerance study) or season long weed-free and weedy (weed control study) check were included for comparison. Treatments were arranged in a randomized complete block design with 4 replications. Weeds were removed by hand as needed in the tolerance study. Herbicides were applied using a CO₂-pressurized backpack sprayer calibrated to deliver 187 L ha⁻¹ using 8003 VS nozzle at 138 kPa. Two rows of ‘Chandler’ strawberry plug plants were transplanted by hand in October 2019 into raised beds covered with polyethylene mulch. Plot size was a 6-m long single raised-bed on 2-m centers. Plants were arranged in a staggered double row with 30 by 30 cm spacing.

Crop injury (foliar chlorosis and stunting) and visual weed control will be visually evaluated using a scale of 0 to 100 where 0 = no injury or no weed control and 100 = plant death or complete weed control. Ten strawberry plants per plot will be harvested once or twice weekly. Strawberries were sorted by hand into marketable and cull grades and then weighed.