A PROPOSAL TO

NORTH CAROLINA SMALL GRAIN GROWERS ASSOCIATION, INC.

FOR RESEARCH OR EDUCATION ENTITLED

Statewide Sampling and Screening of Italian ryegrass Populations to ALS, ACCase, Flumioxazin, and Pyroxasulfone

COVERING THE PERIOD FROM **10/1/2023** TO **9/30/2024**

REQUESTING SUPPORT IN THE AMOUNT OF **$20,000**

SUBMITTED BY:

Project Leader	Departmental Affiliation
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Note: This is a fundamental research or scholarly project and, as such, the University shall be free to publish or disseminate the results of this research or otherwise treat such results as in the public domain, and it will conduct the research in an open forum consistent with the University's mission of research, instruction and public service.

OBJECTIVE(S):

1. Conduct a state-wide survey of Italian ryegrass seed collected from wheat and fallow fields to determine distribution of ALS, ACCase resistance.
2. Determine the response of Italian ryegrass collected in the survey to pyroxasulfone and flumioxazin.

PROJECT DESCRIPTION AND RELEVANCE:

Resistant weed species continue to be one of the greatest challenges facing growers in North Carolina. Although new technologies are on the horizon, no silver bullets exist for current resistant weed problems such as Italian ryegrass. While alternative control methods continue to be investigated, we continue to investigate additional tactics to manage Italian ryegrass in North Carolina.

Over-the-top grass weed control in wheat has been an effective means to control most weed species in North Carolina. However, the continued spread of resistance is a real threat to postemergence Italian ryegrass control. In the fall of 2020, several populations of Italian ryegrass were identified which survived applications of paraquat. In 2021, studies confirmed paraquat resistance as well as ALS-, ACCase-, and glyphosate-resistance in the same populations. These populations also showed elevated tolerance to glufosinate applications.

To preserve and ensure continued use of postemergence grass herbicides, it will be important to establish baseline and distribution of resistance for Italian ryegrass found in production fields. A student has been funded to collect and screen populations from across the state to glyphosate, glufosinate, and paraquat in addition to studies to determine cultural control practices in our cropping systems. In order to understand what is occurring with our other herbicides, we would like to hire a student to work on the remaining herbicide options, especially the PRE herbicides we rely heavily on in wheat production. There has been increasing concern about the use of pyroxasulfone in wheat production in North Carolina, and in the past 2 season we have received complaints of control failure. While there is no confirmed resistance to pyroxasulfone to date in North Carolina, resistance has been confirmed in a rigid ryegrass in Australia. It is a matter of time before resistance occurs here in our state. In hopes of catching resistance early, we propose to survey sites from across the state for resistance to Zidua, Valor, Axial, and Osprey.

The research questions are:

1) What is the statewide response of Italian ryegrass to POST applications Axial and Osprey?
2) What is the statewide response of Italian ryegrass to PRE treatments of Zidua and Valor?

Research Methods:

Italian ryegrass samples were collected from across the state in June of 2022 in anticipation of the funded project and this proposal. Samples were cleaned and studies investigating POST herbicide response began in the fall of 2022 and continue into spring of 2023. One hundred and seventeen samples were collected, and large amount of greenhouse and seed germinator space will be needed to process all the samples for each mode of action. In addition, dose response studies will be necessary to determine a discriminating dose to use on the screen.

If year two of the project is funded, we propose to revisit the samples collected in 2012 and 2013 to determine a baseline value for the residual herbicides, since neither pyroxasulfone nor flumioxazin was widely used at that time.

The results of these studies will allow us to determine the presence and distribution of resistant populations in the state. In addition, looking into the historical response of statewide populations to residual herbicides will provide an idea of any change that is occurring (or shift toward resistance) so recommendations and management practices can be adjusted to continue optimal management. It will provide growers with a snapshot of effective herbicides in their region, and the areas of greatest concern.

RELATIONSHIP TO SIMILAR PROJECTS, IN NC AND OTHER STATES:

No current projects are similar in nature to this proposal.

FUNDS REQUESTED:

2023-24 ..... **$20,000**

Previous funding:

2022-23 ..... $20,000