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FORUM

Grantsmanship Hints

James S. Schepers,* E. John Sadler, and William R. Raun

ABSTRACT

Successful grantsmanship, although a critical skill for researchers, is rarely taught in graduate schools. This handicaps inexperienced researchers, who often must simultaneously develop courses, extension programs, and a research program. As a result, they frequently suffer a lower success rate in obtaining research funding than more experienced researchers. Our objective is to provide the research community with a summary of observations we made while serving in the grant proposal review process. A preliminary list of our observations has apparently enjoyed widespread distribution, suggesting that there is in fact a need for this information. We disclaim any status as experts, offering these observations to those who wish to understand the review process as we observed it while participating in the USDA National Research Initiative Competitive Grants Program.

GRANTSMANSHIP is probably as much a learned skill as anything else. This statement is supported by the observation that young scientists frequently have a lower success rate in obtaining research grants than older and more experienced scientists. Not only do writing skills usually improve with practice, but exposure to the scientific review process creates a broader awareness both of writing styles among researchers and of preferences among reviewers. These experiences usually influence our writing style in the way we organize and express our thoughts.

Our intent is to summarize a series of our experiences and observations. We served as ad hoc reviewers of research proposals, as panelists during the ranking of proposals, and as panel managers during the proposal evaluation process. We have combined our experiences serving on six review panels for various USDA-sponsored programs. Comments are based on experiences gained while collectively reviewing ~80 proposals as panelists and ~160 as panel managers. Total proposals discussed during the various evaluation processes exceeded 400. As such, the authors have been exposed to written comments from ~800 ad hoc reviewers, as well as ~800 in-depth reviews by panelists. Stating these totals provides a basis for the observations discussed below. We do not profess to be expert reviewers or panelists, but rather wish to document our observations for the benefit of those involved in future grantsmanship activities. Many of the following comments are probably little more than common sense and should simply serve as a reminder. In total, however, they may help those contemplating submission of a research proposal. Aside from some general comments, the order of topics discussed follows the format of the 1995 National Research Initiative Competitive Grant Program (NRICGP, 1995). Other programs may have different guidelines, but the discussion should still be pertinent.

The Proposal Process

The Request for Proposals (RFP). Before beginning to prepare a proposal, individuals are encouraged to read the program materials thoroughly; RFPs change from year to year. It is important to avoid anything that indicates you failed to do your 'homework'.

Panel Managers. These individuals can be very helpful by addressing questions about the direction of the program and specifics related to preparation of the proposal. They may even offer suggestions on the appropriateness of a proposal for a given program area. Panel managers welcome questions and feedback from scientists because they help identify where uncertainties exist in the process and where improvements should be considered.

J.S. Schepers, USDA-ARS, 119 Keim Hall, Lincoln, NE 68583-0915; E.J. Sadler, USDA-ARS, 2611 W. Lucas St., Florence, SC 29501-1241; and W.R. Raun, 368 Ag Hall, Dep. Plant and Soil Sciences, Oklahoma State Univ., Stillwater, OK 74078-6028. Received 8 Feb. 1999. *Corresponding author (jschepers1@unl.edu).

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Abbreviations: Co-PI, co-primary investigator; PI, primary investigator; RFP, request for proposals.

Special Categories. Some funding agencies have special grant categories, including grants for postdoctoral scientists and young scientists and strengthening grants for qualifying institutions, which could affect the preparation of the proposal. The proposal approval rate may be considerably higher than normal if you qualify within a special category. If in doubt, contact the program director for specifics, because failure to strictly adhere to program criteria can result in disqualification from a special category. This suggestion cannot be overemphasized. For example, a colleague can be listed as either a collaborator or a co-primary investigator (co-PI) in a proposal. Something as simple as listing a colleague as a co-PI on the transmittal document (usually front page) rather than as a collaborator within the proposal could disqualify the proposal from consideration for some special programs.

The Review. Prospective authors will find it worthwhile to inquire about how proposals will be scored and evaluated. Knowing this frequently helps give appropriate emphasis to the various components of the proposal. Some considerations, like the scientific merit of the proposed research, tend to be more subjective than others. This is because innovative and ingenious ideas can be expressed in many ways. Such statements frequently culminate in a summary of expected results, description of new products, identification of users of the information and technology to be generated, and a statement of potential impact. Above all else, authors are asking someone to fund their work because it addresses a scientific need. A good research proposal should really read no differently than a good scientific paper, differing only by the absence of discussion on obtained results. Day (1983) noted that a scientific publication should enable peers to assess observations, repeat experiments, and evaluate intellectual processes. Like a good scientific paper, the research proposal should identify the problem and delineate where added information is needed. Consequently, it is important to leave program sponsors with the impression that you are the best-qualified individual or team to do the work. Funded projects are invariably those that address the goals of the funding agency. Where appropriate, justify the research from a national perspective; the NRICGP is, after all, a national program. Explain why the USDA, rather than a different agency, a more local entity, or perhaps industry, should support the work.

The Reviewers. When preparing their proposals, prospective authors who have not had experience with the evaluation process are encouraged to put themselves in the place of ad hoc reviewers, panelists, and program managers. These individuals make a number of sacrifices to help make the evaluation process fair and efficient, sometimes with nominal compensation and sometimes without. Because many considerations go into rating proposals, it is important that authors do what they can to minimize confusion and uncertainties. The following comments should help authors avoid problems when preparing research proposals.

The Panelists. Nothing seems to substitute for actually participating in the research proposal review process. To put things in perspective, consider the stages of on-the-job training experienced by a panel member. Each will read about 30 proposals in detail, making written reports. The panelist will lead the discussion for one-third of these and contribute observations to the panel for the other two-thirds. Deviations from the suggested format become quite obvious after reviewing a few proposals, and they are likely to raise questions about the history of the proposal and/or the effort and thought put into its preparation. Deficiencies in proposal content become equally obvious with experience. One panelist summarized it well by stating, "There is a quantum increase in the ability of a reviewer to detect garbage after reading 7 to 10 proposals." There is a second increase after discussing 30 or so proposals within the panel.

The Panel. Evaluation panels represent the collective experience, training, and intellect of a dozen or so professional scientists. Thus, the breadth of knowledge represented is impressive. It is also impressive to observe the interactions and discussion among a group of experts during the 10 to 15 minutes allocated to each proposal. Possible deficiencies not noted by one panelist could be a concern of another or noted by an ad hoc reviewer. Enthusiastic support for a proposal by one reviewer is balanced by the more cautious observations of those in other disciplines.

At first glance, it may seem that it would be difficult for a group of 8 to 12 panelists to agree on the relative ranking of proposals. In reality, group dynamics provide an automatic calibration after discussing a few proposals. In addition, a majority of the panelists are likely to have had previous panel experience. This provides considerable institutional history.

One last characteristic of the readers of proposals is fatigue. Late in the day, forging through a proposal that is difficult to follow or that is filled with superfluous material requires dedication and concentration, and perhaps a little faith based on the reputation of the authors. These impressions frequently come up during panel discussions and can have bearing on the results. To minimize any concerns, it is much better to develop clear and concise statements, because verbosity is frequently interpreted as an expression of vagueness. For these reasons, it is unwise to cut corners, to creatively cheat on things like page limits, or to otherwise stretch the patience of the reviewers.

Prior Submissions. The panelists' institutional recollection often includes memory, as panelists or ad hoc reviewers, of previous submissions. This is not necessarily bad. Even though some authors seem to have an aversion to noting that their proposal is a resubmission, the reality is that one of the reviewers is likely to recognize it as such. In our experience, resubmissions tend to be improved and may even receive favorable consideration, provided they represent good science and address previous comments.

General Observations

The following topics target considerations that should be helpful when preparing research proposals. The top-

ics should be viewed as an integrated package, because there are many links between them.

Scientific Merit. This is the single most important issue in determining suitability for funding. An innovative, scientifically sound idea may withstand minor deficiencies, though that is not guaranteed.

Preliminary Data. Even the greatest ideas and most promising research are easier to sell when accompanied by testimonials, examples, and information that allows others to become involved in the evaluation process. No amount of words, cleverly phrased speculations, or promises will substitute for preliminary data when it comes to evaluating the scientific merit of a research proposal. Integration of preliminary findings into the proposal in the form of a simple table, figure, illustration, or color photograph helps the reviewer understand the process and better anticipate the outcomes.

Clarity of Focus. It is much easier to read and understand a clearly written proposal than one that rambles from topic to topic. Clarity of focus in the proposal also indicates clarity of thought in the research and eventual publication of the results.

Timing. Submit proposals early, because they are probably numbered in the order in which they arrive at the funding agency. Subsequently, they are frequently reviewed in the order in which they are received. The panel is generally more lenient early in the review process because group dynamics are continuously evolving and uncertainty may exist as to the relative ranking of proposals. Reranking later in the review process tends to correct for any inconsistencies, but an excellent proposal that is submitted early tends to serve as a yardstick for subsequent proposals.

Format. Follow the RFP carefully. Deviations may imply past or concurrent submission to another funding source without making the effort to adapt to the prescribed format. Use headers where appropriate for easy scanning and reference by reviewers. While format is important, it should not be viewed as a substitute for content.

Figures and Charts. Visuals are usually helpful if well done, and should be well designed and easy to read. Overly complicated tables are not appropriate and cluttered figures should be avoided because reviewers cannot spend much time interpreting the data. Color illustrations, maps, photographs, etc., may be especially effective.

Page Limits. Do not exceed page limits; doing so could disqualify a proposal. Determine if tables, figures, and photographs fall within or outside the page limits. Failure to comply reflects poorly on the proposal.

Print Size and Line Spacing. The proposal should be easy to read. Proposals with small print and closely spaced lines suggest an attempt to bypass length restrictions and may not be read in their entirety. Use a proportional font; they are easier to read, take up less space, and appear more professional than monospaced fonts. Use a consistent font throughout the document.

Editing. Proofread the proposal several times. Lack of editing implies a rushed or cut-and-paste operation and perhaps indicates that collaborators have not spent much time on the proposal. An internal review is recommended before submittal. Authors should strive to complete their proposals far enough ahead of the submission deadline so as to let it age a few days or more before giving it one final review.

Applicability to the RFP. Read the RFP carefully several times and address as many priority research areas as possible in the proposal, provided the links to the proposal are strong. Reviewers can easily see through superficial objectives and relationships.

Return on Investment. In all cases, scientists should attempt to demonstrate how the research represents a strong bang for the buck. Team linkages that show in-kind services, contributed expertise, and availability of unique and expensive equipment (provided they are essential to the project) will strengthen the proposal. Program managers and reviewers may be required to assess how the proposed research benefits producers (both small and large operations). To this end, the primary investigator (PI) should indicate these linkages and applications or tell how the information generated can be readily implemented. Try to show something more than a site-specific or local application! If the PIs can demonstrate a regional or national application for the information, it suggests that they have given some thought to the effect of different soils, climates, and production systems. Pfeiffer (1989) suggested that all writing has three persuasive goals: to capture the reader's interest; to show credibility; and to sell a particular product, service, or idea. He further noted that although principles of persuasion apply to everything you write, their importance is most obvious in one particular form of job-related writing: the proposal. How convincing is the evidence for conducting added research in the area?

Duplicate Proposals. Authors who are tempted to dust off and touch up a previously unsuccessful proposal should make sure the other co-authors do not decide to do the same thing. Submittal of two proposals where large portions are verbatim will likely be detected because one or more of the same reviewers are likely to see both proposals. As improbable as it may seem, this has happened.

Variation in Reviews. Feedback to authors after proposal evaluation can sometimes be confusing because of the variability in the nature of the written comments. Reviewer comments are subjective, which is why the research proposal evaluation system seeks multiple inputs. Authors can usually gain an appreciation for why a proposal was not funded and get hints on how to improve it if reviewer comments are provided. It is not uncommon for a resubmittal to begin with something like "This proposal is a resubmittal. It was not funded last cycle, in spite of positive reviews... ." Ad hoc reviewers' comments in particular, and even panelists' written comments, are likely to be more positive than the panel consensus. This is because ad hoc reviewers and, to a more limited extent, panelists are specifically selected for their expertise. The full panel has the responsibility to arrive at a relative ranking of all proposals. During the ranking process, other similarly well-received proposals may simply be placed higher. In addition, other panel

members may know of limitations that were not expressed in the reviews. Because the ad hoc reviewers are chosen by discipline, negative comments in their reviews are likely to raise questions during the panel discussion. As a potential ad hoc reviewer, it is important to provide thorough, conscientious, and constructive reviews. These comments should provide enough detail for helpful feedback to both the panelists and the authors.

Specific Observations about Parts of the Proposal

Title. Keep it concise, factual, and descriptive.

Project Summary. This is the second item (after the title) read by most reviewers, so make it consistent with the title and the proposal. Make sure everything mentioned in the project summary shows up in the proposal and agrees in terms of objectives, collaboration, budget, etc.

Table of Contents. May be helpful for long proposals.

Introduction. Provide adequate background that is easy for a diverse group of scientists to read. A strong statement of need for the research is very important. Provide enough information to convince the reader that you have the background information or have done the preliminary research to know that the project is feasible and that you are likely to succeed. Try to convince the reviewer, without being too boastful and without going into great detail, that you are the logical individual or team to do the work because of your background, expertise, and facilities.

Rationale and Significance. This section must persuade the reader of the importance of the research. It also is an appropriate section in which to illustrate that a proposal represents new science. Include a statement of anticipated outcomes: new knowledge, products, applications, and who will use the research results. The review panel will evaluate its merit and impact relative to other projects. It may also be helpful to note the lack of literature in the area to be studied and why added work is needed.

Literature Review. Document with appropriate literature. In addition, show current citations, because a panelist or an ad hoc reviewer will likely be familiar with the most recent literature. A dead giveaway of a recycled proposal or poor literature review is where the most recent citations are several years old.

Objectives. Identify two or three clearly worded objectives that are attainable and that are well integrated into the title. Make sure the objectives can be achieved during the life of the project.

Experiment Plan. It is frequently appropriate to state a hypothesis for each objective. The order in which considerations are discussed in the experiment plan should be the same as stated in the objectives section. The experiment plan should follow a logical order. It should be easy for the reviewer to evaluate if procedures are appropriate and results are attainable for each of the objectives. Failure of the investigators to have sufficient expertise to address the objectives signals a possible hidden agenda, a disguised thrust of the research, or a lack of thorough appreciation for the complexities of the research. It is advisable to include a timeline of activities to summarize events throughout the project.

Products. Identify what they are, who will develop them, when they will be developed, and who will be the intended users. This is especially important for long-term projects.

Collaboration. Recruit the collaboration needed to achieve the project objectives, then tell why collaboration is important and necessary for successful completion of the project. Define or outline the contribution of each scientist involved. Make special emphasis of unique areas of expertise and/or ties with other projects and activities that complement the proposed research. Collaboration with industry is usually a positive feature, unless the panel perceives that the research products are near commercialization and therefore industry should more fully support the research. Avoid including elements for which there is no documented expertise.

Facilities. Show equipment and facilities that contribute to the project. Do not include items in the list of equipment that are unnecessary for successful completion of the project. It is important to show how current projects and/or facilities complement the project and thereby reduce the potential cost of the proposed research.

Vita. All investigators should follow the same format and use a similar font. New scientists should be encouraged to include the title of their graduate research projects so that the reviewers can evaluate their expertise. Make sure the publications comply with the RFP guidelines (e.g., type of publications, acceptable years to include, etc.)

Budget. Reviewers carefully scrutinize budgets for unusual items such as excessive travel, expensive equipment purchases, high labor costs, and excessive numbers of graduate students. Salaries for graduate students are usually viewed as positive, but PI salaries may be viewed as a negative. Scientists on less than full-time appointments should clearly state the situation and justify why PI salaries are appropriate. Time commitments of scientists to the project should match the funding requests for salaries and wages. These items should have supporting justification statements. Equipment purchases and developmental costs also need to be well justified. Analytical costs should match the work to be completed. Show cost-sharing if appropriate and document with a letter of support. In-kind services should be shown or mentioned, provided they are realistic. Fringe benefits and overhead should be clearly stated and show the basis for the calculation (e.g., percent of total funds requested, percent added to funds requested, included or excluded equipment, etc.). Including foreign travel may be inappropriate. Failure to show publication costs may be questioned by the review panel, and publication costs should fit the scope of the products.

Current and Pending Research. A statement should be included to tell how projects with similar titles have different objectives, because it may not be obvious how a current project is different than the proposal being evaluated. Reviewers look for publications from ongo-

ing work with similar topics. Reviewers frequently question token or minimal time commitments; those <5% are probably not appropriate. Failure to cross-list current and pending research suggests that a PI may be trying to hide something, or that one or more of the investigators had little input into proposal preparation and review.

Special Considerations. Carefully examine the RFP for special categories (e.g., postdoctoral, new scientist, small institution, or targeted group) that may fit. Even though your proposal may not rank near the top for various reasons, you may still be considered for funding within special categories if the proposal is well prepared and represents good science.

SUMMARY

We recommend that all prospective authors consider the purpose of the proposal, which is to convince the funding agency that their work is worthy of funding. Funding agencies and their consultants who review the proposals will attempt to determine the ones most likely to provide the most new science within the limits of the RFP. The attempt, while not guaranteed to be perfect, has evolved through multiple cycles to be fair, unbiased, and as objective as possible. However arbitrary the review process may appear to the unsuccessful authors (and however affirming it may appear to the successful ones), the quality of the review process, as seen from the inside, favorably impressed the authors of this work. We hope that this communication serves both to build faith in the process for future potential PIs and to provide the means to improve the quality of proposals.

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TURFGRASS MANAGEMENT

Dehardening of Annual Bluegrass and Creeping Bentgrass during Late Winter and Early Spring

Darrell K. Tompkins,* James B. Ross, and David L. Moroz

ABSTRACT

Changes in cold hardiness levels of annual bluegrass (*Poa annua* L.) and creeping bentgrass (*Agrostis palustris* Huds.) were monitored under field conditions during the dehardening period of late winter and early spring. During the course of two spring periods the cold hardiness levels of the two species were monitored in conjunction with the following hydration treatments: snow cover maintained to prolong dormancy, snow removal in March, and hydration of crown tissues in combination with snow removal. Cold hardiness levels, percent crown moisture, and soil temperatures were monitored throughout this period. Cold hardiness levels were significantly influenced by year, species, hydration treatment, and a number of interactions of these factors. Generally, plants dehardened 2 wk earlier in 1997 than in 1996. On 1 April, creeping bentgrass had cold hardiness levels averaging −20°C compared to −13°C for annual bluegrass. By 15 April, creeping bentgrass plants had lost their cold hardiness advantage. Increased soil temperature was the greatest contributor to the loss of hardiness in the spring. An increase in crown moisture of 4% for annual bluegrass and 6% for creeping bentgrass occurred during the period from 25 March to 22 April. Maintaining a snow cover on plots delayed the loss of cold hardiness by 6 to 9 d in 1996 but had no effect in 1997. Maintaining a snow cover also delayed the increase in crown hydration by a week. Plants were able to partially regain cold hardiness when soil temperatures dropped.

Prairie Turfgrass Research Centre, Olds College, 4500 50th St., Olds, AB, Canada T4H 1R6. Received 20 April 1998. *Corresponding author (dtompkins@admin.oldscollege.ab.ca).

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For many golf courses with creeping bentgrass greens, annual bluegrass invasion is a major weed problem. Consequently, older turf is often entirely taken over by annual bluegrass. Then maintenance, rather than eradication, is the primary concern. Winter damage to annual bluegrass greens is a problem that affects golf courses in cold climate areas (Beard and Olien, 1963). In these areas, where creeping bentgrass or annual bluegrass greens are commonly maintained on golf courses, cold hardiness levels are greater for creeping bentgrass than for annual bluegrass (Beard, 1966).

Cold hardiness levels for plants fluctuate from year to year. Soil temperature during the cold hardening period plays a critical role in determining the hardiness level. In order to achieve the full level of cold hardiness, a period of freezing temperatures may be required (Gusta and Fowler, 1977a). Cold hardiness levels decline slowly with time when plants are maintained at temperatures just below freezing, but this loss of cold hardiness occurs more rapidly if plants are stored at colder temperatures (Gusta et al., 1997).

While cold hardiness levels can vary widely for different species (Gusta et al., 1980), conditions during the dehardening period in the spring may play an important role in determining the amount of winter damage that

Abbreviations: LT_{50}, the lowest temperature at which 50% of the plants survived freezing injury.