Cultivating good writing in Agronomy

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ABSTRACT

Editors past and present have said that writing in agronomy can be improved. Today's student frequently is deficient in basic writing skills and receives little or no training in scientific and technical writing. Nevertheless, agronomists write extensively in their careers, and writing is essential to the advancement of science. Reviewers and editors try to help the new writer. Teachers of agronomy, crop science, and soil science also should try to assist students in writing good manuscripts. "Agronomese," the gobbledygook of our specialty, can be identified and corrected. Developing a critical sense in the student will help him avoid agronomese. Two writings on weeds are analyzed to illustrate one method of critical review. Tips on how to teach writing abound in the literature of technical communication. The creative instructor can use examples from technical literature to help students read critically, so they can write clearly. Two appendices are presented as aids to the teacher: part of a survey of editors and examples of faulty writing from the technical literature.

Additional index words: Agronomese (gobbledygook of Agronomy), Teaching scientific and technical writing, Survey of editors, Critical review of manuscripts, Writing style.

Producing good technical writing is as difficult today for some agronomists as it was yesterday (Thatcher, 1927; Haag, 1952; Gregg, 1954; Howell, 1969). Editors agree that writing quality should be better.

Teachers of agronomy testify that students receive little or no training in technical writing. Yet everyone is aware that even the student who is ill-prepared for the writing task will eventually find that he must write extensively during a career in agronomy. The task is identical, communicating through a transaction—a writer, subject, medium of language, and a reader—but the exchange may be difficult (Zinsser, 1976). Just as some agronomists succeed as scientists more than others, some agronomists will succeed as writers more than others. Training can make a difference.

Yet, like the student, the teacher of agronomy, crop science, and soil science has rarely been schooled to write technical reports and articles well. During graduate years, teachers receive little formal training in writing and imitate the writing of their peers. The teacher may even have acquired a certain type of technical writing as an obligation in his training. This type of writing, which has been documented for fields other than agronomy (Woodford, 1967; DeBakey and DeBakey, 1978), is arduous, onerous, and dull.

This paper argues that we should try to cultivate good writing in agronomy and that the teacher can and should help.

AGRONOMY AND WRITING

Writing is essential to the advancement of agronomy, and of science. Writing is as much a way of thinking as it is a method of expressing thought. Research begins with a statement. The statement points the way toward making certain observations, which, stated for others, allow verification. The fact (verified observation) and the thought are linked. Writing is the link, the agent of change in the sciences. Revolutionary changes in the sciences, therefore, may result as much from new ways of looking at facts as from the facts themselves.

Scientists, who are primarily concerned with technical information, will and must work hard to extricate facts from the verbiage of technical literature. Some material, of course, can be skimmed—equations, tables, and illustrations—but most manuscripts must be read. The reader tries to understand and evaluate the writer's work. For this reason, characteristics of the reader are most important in successful writing.

Who is the reader? Zinsser (1976) described the reader as a person with an attention span of 20 seconds. Strunk felt that the reader is in trouble most of the time, "a man floundering in a swamp, and that it was the duty of anyone attempting to write English to drain the swamp quickly and get the man up on dry ground, or at least throw him a rope" (Strunk and White, 1959).

Reviewers and editors are the first readers of the technical manuscript.

Reviewers try to help the writer. The reviewer focuses primarily on the importance of the research question, originality of work, experimental design and technique, and soundness of conclusions (DeBakey, 1976, p. 15). Reviewers examine writing quality last, if at all, and they may not be competent to judge it.

Editors become aware of their limitations, and readily admit the difficulty of coping with a steady stream of poorly written or marginally acceptable papers. Technical editors of journals, we assume, have been selected by their peers because of their experience and writing competence. But they do not have time to improve the style of every manuscript. Neither are they experts in every field, and they cannot read the minds of authors who do not make papers clear. Copy editors, and others

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who move the paper toward publication, are concerned with correcting and preparing a manuscript for typesetting and printing (DeBakey, 1976, p. 91).

LEARNING TO WRITE

Writing is an exacting task. An agronomist usually finds his first manuscript difficult to produce. He may consult an advisor, and he will imitate other writing in the field. Rarely he may consult one of the many excellent textbooks on technical writing, and if he is submitting the manuscript to a journal, he will refer to style manuals. When the manuscript has been finished, advisors, reviewers, and editors do exert special effort to help the new writer. But, judged by the published literature, and the comments of editors (Appendixes 1 and 2), these efforts fall short. Successful writing depends primarily on the build-up of skill by the writer.

Persons helping the new writer are not trying to build permanent skill. They are agronomists, not teachers of writing. Although reviewers and editors manage to achieve a publishable manuscript after working with an author, this work does not mean that the author will produce the next manuscript easier and better. The effort of helping a new writer is patch-up.

Without the foundation of writing skill, then, each author, in a sense, is a new writer. The task may become easier with practice, especially if the author follows the form of the published literature. He certainly will assimilate the jargon, syntax, and verbiage of technical material. But this imitation may not result in good technical writing. To put it bluntly, the self-taught writer has been taught neither to read critically nor to write skillfully. A framework for these skills has not been laid.

WRITING IN AGRONOMY

It is easy to identify writing problems in agronomy. The faults can be classified, as they have been in other fields, and we can label such writing “agronomese” to rank beside “medicalese” and “educationese.” DeBakey (1968), by dissecting published medical articles, stripping them of their jargon, cliches, vogue words, pretentious diction, verbiage, and imposing statistics, has exposed the claptrap, bombast, empty thesis, flimsy or illogical argument, and invalid conclusion in medicalese. Among the infelicities DeBakey has found in medicalese are the following:

1. “Letters are blurred when the patient reads.”
2. “Birth weight and gestation were obtained for 245 deaths with congenital heart disease that were autopsied.”
3. “The most ardent proponents of the female genital tract as the offender based their arguments on observation made in the 1920’s.”

Appendix 2 contains comparable examples from writing in agronomy, such as the following:

1. “Years were taken as random variables.”
2. “The thickness now present in the valley are a minimum because erosion has removed an unknown amount of sediment.”
3. “The weed’s habit of growth is the reason it becomes such a problem.”

These “verbal improprieties” pervade most professions. They trace to several sources, including human pride, the herd instinct, and the classroom, where English is presented as a dull subject or is completely ignored (the classroom of the technical course). The DeBakeys demand of physicians what Edwin Newman (1974, 1975) asks people to demand of all leaders, especially political leaders, “to speak better English so we will know what they are thinking about, and so they will too.”

To read literature critically takes brains, brass, and faith that the exercise will do some good. A harsh explanation for poor writing may be that agronomists do not want to work as hard at writing as they do at agronomy. A simpler reason may be that poor writing reflects nothing more than a lack of training and of ingrained habits. Unfortunately, if a writer will not or cannot expend energy to produce good writing, the reader will surely expend energy in reading poor writing. (The reader also may simply move on to another article and, perhaps, disregard poorly described work and carry out an unnecessary experiment of his own.)

THE CRITICAL SENSE

Teachers of agronomy, crop science, and soil science can help students improve their writing and reading. To help the student distinguish between standard English and nonstandard English usage, the teacher needs to set a good example and to show good writing. Cultivating in the student certain “rules,” such as examining the meaning of every word in context, should help the student develop a critical sense.

Before this critical sense can be awakened, the teacher needs to be assured that language skills are present in the student. Today’s student has poor mastery of basic skills (Anon., 1975), although there is a counter trend back to structure and “basics” (Etzioni, 1978). Schools are also beginning to emphasize “basics” of writing. The University of Wisconsin’s School of Education, has announced that beginning in the fall of 1979 students will have to prove they can write adequately before they will receive a student teaching assignment. These efforts may improve the situation in the future. But the language and thinking of these students will challenge the agronomy teacher well into the 1980’s (Fuccillo, 1976).

It may be the teacher’s job to help students acquire basic skills. Writing is hard work, and it is learned mostly by writing. For the highly motivated student, the teacher can recommend many excellent textbooks and encourage the student to write. Others, even mature scientists, would benefit from taking courses in technical writing. Where courses are not offered, the teacher of agronomy could 1) enlist a colleague to teach writing,
2) team up with someone, or 3) teach a writing course alone. At some campuses, notably Michigan State University, courses have been arranged through cooperation between scientists and humanists (Carlisle and Kinsinger, 1977). A textbook has been designed for use by the scientist in teaching writing (Woodford, 1968). Books and articles are being continually written for the professional who must write (O'Connor and Woodford, 1975).

**TIPS ON TEACHING CLEAR WRITING**

A bit of theater in some hands livens up the subject of clear writing. Observe this Associated Press story in the *San Francisco Examiner* (Anon., 1977) as an example of a piece that may be used to illustrate gobbledygook.

<table>
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<th>WHAT THEY'RE UP TO DOWN AT THE SCHOOL</th>
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HOUSTON: The parent of a Houston high school pupil received a message from the principal about a special meeting on a proposed educational program. It read:

"Our school's cross-graded, multi-ethnic, individualized learning program is designed to enhance the concept of an open-ended learning program with emphasis on a continuum of multi-ethnic, academically enriched learning using the identified intellectually gifted child as the agent or director of his own learning.

"Major emphasis is on cross-graded, multi-ethnic learning with the main objective being to learn respect for the uniqueness of a person."

The parent wrote the principal:

"I have a college degree, speak two foreign languages and four Indian dialects, have been to a number of county fairs and three goat ropings, but I haven't the faintest idea as to what the hell you are talking about. Do you?"

The literature of technical writing is a goldmine of examples for the teacher who wishes to hammer home the point. Excellent writers have compiled danger signs to alert the average writer that he is using obscure expressions. The following list, condensed from Barzun and Graff (1977), contains words that the self-critical writer will deny himself.

**JARGON**
- commitment
- concept
- de-emphasize
- essential(s)
- (re)evaluate(-tion)
- initial (= first)
- major
- motivation
- parameter

**AFFECTIONS**
- dimension (figurative)
- formulate (= say)
- precisely
- state (= say)

**ILLITERACIES**
- general consensus of opinion
- overly, thusly (= over, thus)
- presently (= now)

The words are good, Barzun says, but they have been spoiled by careless or excessive use until, in their "figurative or vogue sense" they no longer mean much. For example, the following sentence did not, but could, appear in agronomic proposals, which are being written frequently today: "A major parameter to finalize the approach was the meaningful concept of formulating essential dimensions." The words are so good that the fictitious sentence nearly makes sense.

**DISTANCE AND CRITICISM**

Individuality of expression and inevitability of criticism are ideas that go back a long time. Matthews (1876) said that there is hardly an abstract term in any language which conveys the same meaning to two different minds—a man born blind compared red to the sound of a trumpet; a deaf man described the blowing of the trumpet as red. Criticism requires both the blind to see and the deaf to hear. H. G. Wells reportedly said that no force on earth is stronger than that seizing one person to correct another's prose. The ideas are building blocks to communication. Understanding them is important. The ideas can be treated separately or together.

A framework for both self-criticism and peer criticism should be created for the student. The teacher can create distance from a piece of writing, a prelude to self-criticism. The lesson will be valuable for the student. Smith and Scifres (1972) observe that an agronomic writer can improve a paper by reading and reviewing it himself from 1 to 4 weeks after writing a draft. The teacher can require the student to submit a paper just before a semester break, hold it until after the break, and then ask the student to read it critically before resubmission. The teacher will benefit from this procedure because he will read a second draft rather than a hurried first draft. The exercise is realistic; reviewers and editors will attest that they can spot an "unseasoned" draft. Publications manuals urge that a
writer should obtain informal review within his own institution before submitting a manuscript for publication (Handbook, 1976; CBE Manual, 1978).

Peer review for the student can be simulated if other students read and react to the manuscript. A seminar atmosphere can be used for this criticism, or small groups of students can be assembled for discussion of papers written by members of the group. The critique of student papers by students has been handled successfully when ground rules and a basis for criticism have been established (Chernin, 1972; DeBakey, 1965). The setting should be openly discussed with the students before critique sessions; common sense rules of constructive comment, courtesy, and sticking to the manuscript. Writing rules can be practiced at these sessions (Woodford, 1968; Strunk and White, 1959). Because classroom review differs greatly from the anonymous review used in most scientific publications, its purpose should be emphasized: to teach the student to read critically, to respect individuality of expression, and to accept valid criticism.

ASSIGNMENTS IN EXPOSITION

A pronouncement of good writing or a definition of good style that consists of abstractions will fall short of instructing the student to write well. The teacher can lead the student by examples, but writing is best learned by practice. Assignments could be given in fields or specialties in which the student is interested. Whole articles or specific types of writing, like the writing of abstracts, may be assigned. Thorough training will also be needed in construction of tables and graphs, in statistical presentation, and in literature review.

Although a noble aim, it is impossible to prepare every student for writing the diverse material he will be called upon later to produce—theses, articles, reports, proposals, and books. The student knows a limited number of technical subjects from which to choose. Examples from published literature can be used to teach commonly used forms of writing. Teachers of both exposition and technical writing have used the definition as one form of writing practice. Experienced writers and editors recognize that it is always difficult to define critically even the most simple terms of everyday use.

THE "GOOD" EXAMPLE

Finding and using examples of effective writing from the agronomic literature may be risky and difficult, but holding up good examples will make mastery of writing techniques a realistic goal for the student. Articles on the same or different subjects can be compared to illustrate common tasks in technical writing. I will end with an example.

To illustrate this method, I chose the two articles, written by men differing in temperament, background, and scientific culture. They address their audiences in a remarkably similar way. Both authors define weed, a controversial word, and attempt to persuade the reader to accept the definition each gives.

1. Catching the Reader's Interest

Pieters (1935) begins in the leisurely style of the period. "At the present time, a great deal of interest centers in weeds, especially in the control of some of the most obnoxious ones. The question arises, therefore, what is a weed?"

Harlan (1975) begins, "Because of the importance of weeds to agriculture and their probable roles in plant domestication, it is important that we have clearly in mind what is meant or implied by 'weed'"

Both use the weed's importance to gain the audience's attention. Harlan interjects the main subject of his interest in that first sentence. He is a plant evolutionist, and domestication of plants is high on his list of priorities, and so it should be on the reader's list. Pieters uses a subtle tug on the professionalism of the reader to interest the reader and to identify him with the subject. Admitting that the question is academic, Pieter says, "Agronomists should, however, be able to define their concepts as comprehensively and accurately as possible and hence it may not be out of place to renew the inquiry as to the proper definition of weed."

2. Taking a Stand and Documenting

Pieters and Harlan spurn accepted definitions of weed. To Pieters, the view of the time attributed to "the late Dr. Beal, of blessed memory...has always seemed...somewhat unsatisfactory." To Harlan, "Some of the current definitions used in agronomic instruction...are clearly inadequate."

They ultimately redefine weed, through expository writing, by showing how the accepted definitions fall short. Pieters, enchanted with plants, uses a personal writing style and takes the reader through his garden. Harlan, no less enthusiastic about plants, assembles his evidence with tables, diagrams, and 50 references.

3. Placing Sources in Perspective

Dictionaries become the starting point in battles of definition. Pieters and Harlan consult them but cite technical sources to enrich their descriptions, placing every document in a landscape of their design.

Pieters rambles through his garden, where seedlings of the American elm, Kentucky bluegrass, and white clover serenely grow alongside vegetables. In an earthy discourse, he asks the reader how we can call such useful plants "weeds" when elsewhere they would be called trees, pasture, and soil enricher; he cites a Forest Service classification, horticulture cyclopedia, and Farmer's Bulletin to back his claim.

Harlan categorizes his literature sources by the type of person stating the definition. He stalks the world, with the reader at his side, to broaden the view of weed plants, weediness, and the place of weeds alongside crops and man.

Thus, through similar tactics, both men prepare the reader for their definitions.

4. Ending with Clear (Albeit Qualified) Truth

When presenting the definition, neither Pieters nor Harlan leaves the reader with a shred of doubt as to where he stands, but each qualifies the statement: Pieters at the beginning and Harlan at the end.

Pieters: "The writer realizes that the application of the definition offered depends on our knowledge of a given plant.
This may be incomplete, but so soon as the characteristics of a plant become well known it should be possible to place it in its proper classification, and a weed would be a weed even though temporarily useful to man; a plant like white clover would never be called a weed though it may be temporarily annoying.

"Attention is called once more to the fact that in long-established usage, the term 'weed' did not mean 'a plant out of place,' but meant an injurious plant with no good in it. The term 'a plant out of place' is a catchy one but does not conform to ancient usage and permits the inclusion of useful plants among weeds because the useful plants sometimes grow where not wanted.

"Possibly a modification of the definition in Farmers' Bulletin 660 might meet the case and we might define a weed as 'a plant that does more harm than good and has the habit of intruding where not wanted.'"

Harlan: "Weeds are adapted to habitats disturbed by man. They may be useful in some respects and harmful in others. They may be useful to some people and hated and despised by others. There are weed races of most of our field crops and these interact genetically with cultivated races as well as truly wild races. This interaction probably results ultimately in better crops and more persistent weeds. Although some weeds have evolved elegant adaptations under the influence of man, many had weedy tendencies before man existed. Weeds are products of organic evolution; they exist in intermediate states and conditions. They are also genetically labile and phenotypically plastic. Weeds have been constant and intimate companions of man throughout his history and could tell us a lot more about man, where he has been and what he has done, if only we knew more about them."

AFTERWORD (A RESTATEMENT)

The central thesis of this article on "Cultivating Good Writing in Agronomy," is that agronomists should try to do so. I have exhorted teachers of agronomy to encourage their students to cultivate good writing, and whenever possible to help students improve skill in writing and critical reading. Writing can be difficult for experienced agronomists, and it is learned best by practice. The writer of technical manuscripts relies heavily on reviewers and editors to sharpen thought that is expressed in language. The reader appreciates the help of reviewers, editors, and writers when their work results in understandable prose. The teacher can join in lightening the burden of the reader. Two Appendices have been compiled to assist the teacher. Appendix 1 shows how editors perceive good scientific style and how they view the current literature. Appendix 2 can be used by the teacher to illustrate common faults in technical writing. Some of the examples have been rewritten, but most of them are offered as rewriting exercises for the teacher and student.

APPENDIX 1—SURVEY OF EDITORS

During the summer of 1977, I completed a survey of 160 editors for publications of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. The questionnaire began with Woodford’s (1968) definition: "Good scientific style consists of rational construction of sentence and paragraph (logic), absolute accuracy of expression (precision), ready comprehensibility (clarity), directness, and brevity." Five yes/no questions and responses follow. The rest of the survey elicited prose answers.

1. Are manuscripts better or more poorly written now than in previous years?
   Better, 34 (42%) Worse, 7 (9%) Same, 40 (50%) (n = 81)

2. Is the quality of scientific style in society manuscripts better, the same, or worse than that in manuscripts you have read for other publications?
   Better, 38 (48%) Worse, 6 (8%) Same, 35 (44%) (n = 79)

3. Can scientific style of manuscripts submitted to society journals be improved?
   Yes, 63 (93%) No, 4 (6%) Equivocal, 1 (2%) (n = 68)

4. A. Have you tried to improve scientific style in manuscripts submitted to society Journals?
   Yes, 71 (89%) No, 5 (6%) Equivocal, 4 (5%) (n = 80)

B. Were your efforts successful in the short term? (That is, did they result in better-written papers?)
   Yes, 62 (78%) No, 6 (8%) Equivocal, 11 (14%) (n = 79)

C. Were your efforts successful in the long term? (That is, did the authors write better papers later?)
   Yes, 22 (28%) No, 7 (9%) Equivocal, 49 (63%) (n = 78)

5. Do papers with poor scientific style take longer to process than those with good style?
   Yes, 80 (98%) No, 0 Equivocal, 2 (2%) (n = 82)

The University of Vermont recently surveyed 69 selected journal editors in North America, 1,265 scientists in 12 Agricultural Experiment Stations in the Northeast, and 24 Station Editors. A preliminary report had just been distributed at this writing (Wales and Ashman, 1978). Among the findings, journal editors considered 61% of the manuscripts they receive are of "average" or "below average" quality; 29% were rated "excellent" or "above average." By contrast, 67% of the Station scientists rate their writing ability as "excellent" or "above average." Although Wales and Ashman do not link these findings, they do venture that the figures, "perhaps indicate that authors of scientific manuscripts may not write as well as they think they do." The figures, I believe, do point up a disparity of views between authors and editors about what constitutes good writing.

APPENDIX 2—EXAMPLES FROM TECHNICAL MATERIAL

From Manuscripts Approved for Publication

1. Stacked nouns and modifiers
   . . . estimates of general combining ability mean squares.
   . . . using a modified cubic spline smoothing program.

2. Due to and lack of clarity
   Plant mortality was high due to infestation of insects.
   Lack of responsiveness at higher plant densities observed among various commercial maize hybrids may be due to the fact that these varieties had a long history of selection under medium to low plant population densities.

(Rewrite: Some of the commercial hybrids of corn did not respond at high densities, probably because they had been selected under low densities.)

3. Smothered verbs
   An evaluation of the genotypes for nonstructural carbohydrate content was also included for further characterization of their chemical composition.

4. Shorthand
   Years were taken as random variables.
5. Turgid, embedded sentence.
   Limited field research relating grain sorghum root development to top development at more than one stage of growth prompted this study to investigate the relationship between depth and distribution of grain sorghum roots in the field and above ground morphological development (plant height, leaf area index, and dry matter) during the growing season under irrigated and nonirrigated conditions.

6. Nonparallelism
   In 1973 the growing period was about 2 weeks longer, was warmer, and had better distributed rainfall than the 1972 season.

7. Basis
   Top dry matter data are presented on a grams per plant basis.

8. “As well as” and lack of clarity
   Quality of RF-treated seed samples was maintained in storage at 4C and 50% relative humidity as well as that of untreated control samples for up to 15 years after treatment.
   (Rewrite: Quality of RF-treated seed, maintained in storage at 4C and 50% relative humidity for up to 15 years after treatment, was as good as that of untreated control seed.)

9. Repetition
   After leaf excision and sealing, the psychrometer assembly was placed into a controlled temperature bath which allowed stable temperature conditions.
   (Rewrite: After leaf disc excision and sealing, the psychrometer assembly was placed in a controlled temperature bath.)

10. Weediness (Prolixity)
    The roots of NH₄-fed plants contain low, as compared to NO₃-fed plants, levels of organic anions as their carboxylates are utilized in the formation of amides which are then rapidly transported to the tops.

11. Abstraction resulting in vagueness
    Plants generally exhibit some plasticity in response to different population densities and the resulting environmental conditions.

12. Marathon sentence
    Liming was effective in reducing tissue Zn concentration and overcoming dry matter yield reduction due to excessive Zn uptake but did not change the acid extractable soil Zn level.

From Published Literature

1. Lack of precision
   Nevertheless, the chemists now seem to be too low and will probably be increasing their course requirements again. . . I doubt that we and the chemists shall meet at the mid-point between our current positions.
   Fig. 2—A plant-growing laboratory session.
   A voluminous literature supports the view that students are reliable evaluators of teacher characteristics and effective teaching.
   The thickness now present in the valley are a minimum because erosion has removed an unknown amount of sediment.

2. Obfuscation and jargon
   It is to be hoped that they will continue to apply the same integrated problem-solving approach used to increase crop production to other aspects of agriculture and rural living problems such as storage and marketing, roads, soil conservation, schools, and community services.
   Insofar as there were differences associated with schools along measured dimensions, the differences are attributable to the social composition of the schools.

3. Educationese
   ... the educational philosophy climate is right for our vigorous reentry into integrated problem-solving student participation type of teaching.
   ... to facilitate the human resources necessary in line with the research priorities to activate the programs.
   ... to plan the necessary infrastructure in line with the research priorities involved to facilitate the achievement of the end results which was problem-solving.
   The rewards to the students and to the faculty are so many that administrators and chairmen should encourage each of their faculty to consider developing alternate educational strategies which will help ensure that the learning environment is maximized.

4. Verb problem
   It would be an impossible task for any one laboratory to carry out a comprehensive survey of all cultivars, and equally important, all growing conditions and locations.

5. Bureaucratese
   ... that total support of this new program would be fully justified by the resultant capability to collate and coordinate the agricultural research efforts in the nation to a point commensurate with the accountability imposed upon the Department.
   These individuals not only must structure programmed research approaches but maintain the atmosphere in reviews to assure program consciousness. . .

From Student Papers

These faults, mostly the result of illogical thinking, resemble (imitate?) those of published literature and manuscripts submitted for publication.

The weed's habit of growth is the reason that it becomes such a problem.
   The process is still in its initial planning state.
   It is interesting to note that the most discoveries have occurred in tropical areas where underdeveloped countries could utilize such systems to an even greater extent.
   Man is highly inefficient as a laborer. He would have to lift 100 pound bags of fertilizer 4 feet over 82 times per minute to equal the work capacity of one horsepower.
   When confronted with a salinity problem, there is a logical and stepwise procedure you can follow to select the proper type of plant.
   Sometimes conditions exist where a certain type of salt in the soil is dominant.
   The principle behind this is that water in the soil makes it plastic in nature (ability to hold a form) that is, the more water in the soil the more plastic it becomes, thus the soil's ability to form a ball.
   Each of these tests differ in their ability to detect aflatoxin.

LITERATURE CITED

2. ————. 1977. What they're up to down at the school. San Francisco Chronicle (January 27).


8. ———. 1968. They all laughed when he sat down to write. Medical World News. p. 82–86 (September 20).


