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Research Review

by
WAYNE C. MORGAN
WHAT WE SHOULD KNOW
ABOUT POTASSIUM I

Credit: "Divot News", Vol. 20 No. 13
May, 1982

Although the role played by Potassium (K) in plant nutrition has long been known, the importance of potash fertilizers has received full recognition only in comparatively recent years. A survey taken during 1963 and 1964 in Los Angeles County showed almost one half of the samples tested below that considered adequate for turfgrasses.

The presence of adequate available potassium in the soil has much to do with the general tone and vigor of the plants grown. It is known that potassium improves the ability of the plant to withstand adverse conditions. Besides increasing plant resistance to certain diseases and winter hardiness, potassium also encourages the growth of plant roots. Potassium tends to counteract the ill effects of too much nitrogen and/or phosphorus. In a general way, it exerts a balancing effect on both nitrogen and phosphorus.

A recent article in the California Turfgrass Culture, April, 1968, by Dr. Roy L. Goss and Dr. C.J. Gould stated that potassium plays an important role in turfgrass vigor, which in turn influences disease development.

Potassium serves many roles in the grass plant and, if it becomes deficient can cause:

1. Accumulation of carbohydrates that cannot be synthesized into proteins.
2. Excess of non-protein nitrogen.
3. Failure to produce new cells for lack of amino acids essential for protoplasm formation.
4. Slower growth of meristematic tissue that permits replacement of diseased tissues.
5. Thinner cell walls and epidermal tissues.

The readily available potassium constitutes only about 1 or 2 percent of the total amount of this element in an

average mineral soil. Although most of this available potassium is in the exchangeable form (approximately 90%) soil solution potassium (approximately 10%) is somewhat more readily absorbed by higher plants and is subject to considerable leaching loss. Roots can absorb a small percent of potassium in the exchangeable form.

Deficiency symptoms for lack of potassium on the grass plant are slow growth and light green or yellow color of the blade and stolons. Tips of older leaves may die and the turf may have a "dry appearance".

Most mineral soils, except those of a sandy nature, are comparatively high in total potassium. In fact, the total quantity of this element is generally greater than that of any other major nutrient element. Yet the quantity of potassium held in an early available condition at any one time often is very small. Most of this element is held rigidly as part of the soil minerals or is fixed in forms that are at best only slightly to moderately available to

CONTINUED PAGE 16

SEEKING POSITION AS SUPERINTENDENT OR ASSISTANT SUPERINTENDENT

Stephen John Meyer, 5030 Cooley Lake Road, Pontiac Michigan 48054. Phone: (313) 681-2466. Age 25, Single, Health excellent. Received B.S. in Agriculture with a Turfgrass Management major from Michigan State University in December, 1982. College education financed mostly by Evans Scholarship program. Have five years experience at Orchard Lake C. C., Orchard Lake, Michigan, under the supervision of Mr. James Timmerman, Superintendent. Available immediately.

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Director of Research
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'REGAL' perennial ryegrass (*Lolium perenne* L.) is a 3-clone synthetic cultivar developed by International Seeds, Inc. The parental clones were selected by turf testing open-pollinated progeny obtained from a population of turf-type perennial ryegrass spaced-plants assembled at Albany, Ore., in 1972.

The three parent clones included derivatives of clones selected for fine turf appearance from old turf areas in the mid-Atlantic region of the U.S. by C. Reed Funk and other workers at the New Jersey Agric. Exp. Stn.

Regal was released in 1977 and first certified seed was harvested in 1977. PR. 731 was the experimental designation of this cultivar.

Regal is a low-growing, dark green, fine-textured cultivar with medium turf density and good turf performance in many areas of the USA. It has demonstrated particularly good turf performance compared to other ryegrass cultivars in the areas having severe summer stress. It has the rapid germination and establishment characteristics of other perennial ryegrasses and is comparable to the majority of currently available turf-type ryegrasses.

Regal is moderately susceptible to brown blight incited by *Helminthosporium siccans* Drechsler and has good resistance to brown patch caused by *Rhizoctonia solani* Kuhn. It has demonstrated better tolerance to summer stress than other cultivars tested. It has good winter-hardiness compared to older cultivars such as Linn, NK100, and Game, and is com-

parable to most other turf-type cultivars.

Regal is commonly used for cool-season turf. It is used alone and also in blends with other cultivars and in mixtures with other turf species such as Kentucky bluegrass (*Poa pratensis* L.) It is well suited and commonly used for fall overseeding of dormant turf areas such as golf greens, tees, fairways and lawns in the southern U.S.

None of the parental clones of Regal appear to carry the genetic factors for strong fluorescence in seedling roots. Regal is very early in maturity and has demonstrated good seed production in western Oregon. Seed propagation is limited to the breeder, foundation, registered, and certified classes of seed. Breeder seed is maintained by International Seeds, Inc., P.O. Box 168, Halsey OR 97348, United States Plant Variety Protection Application No. 7700110 is pending for Regal.

International Seeds, Inc., Halsey, Ore., has been granted trademark protection for its overseeding blend Ph.D.[®] by the U.S. Patent and Trademark Office according to Harry Stalford, Products Manager.

Stalford said Ph.D.[®] is a blend of three leading perennial turf-type ryegrasses. Ph.D.[®] has been used extensively for the winter seeding of golf courses in the Southern U.S. and for the reseeded of athletic fields, Stalford said. Stalford said that Ph.D.[®] has been marketed since 1980.

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COMPENSATION A View from the other side

by: Melvin Weinstein
The Florida Green,
Summer Issue

The issue of compensation for superintendents has surfaced big over the last 10 years. We see coming on the scene, a highly skilled individual with schooling, and solid golf course apprenticeship. These facts have made the superintendent's position one that is highly skilled and knowledgeable. Is management paying for this expertise?

We have superintendents caring for properties that would cost millions to replace. their annual salary cost is minimal considering the cost of fatal mistakes and mismanagement of these properties.

Like everyone else, the superintendent must prove his worth. He must be able to give the club the finest course available for whatever budget management

approves, then he must remain within this budget. This is critical, since poor financial management will sour the whole picture. Management must also be aware of what kind of course the budget will allow and not make "pie in the sky" promises. the superintendent must follow through on any commitment he makes. Don't tell management something is going to be done and then forget about it for several weeks. Results not promises gets the job done. Management must be made aware of why goals can not be met. Honesty is the best policy.

With budgets escalating, clubs expect more and more for their dollars. If the superintendent is producing, management will be happy. Whether they translate this happiness into salary is the issue. The superintendent however can not sit back and wait. He must

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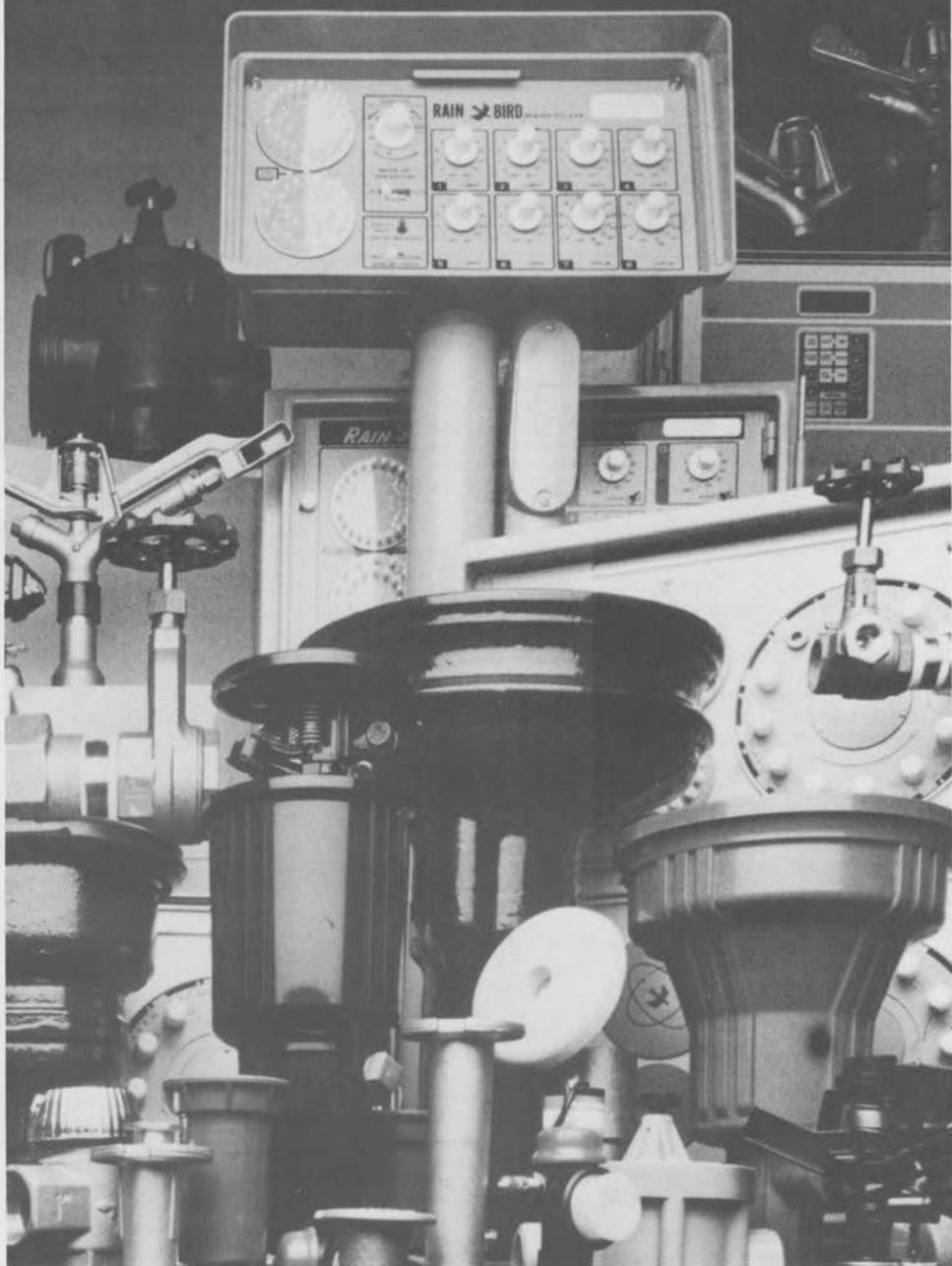


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The book, a detailed, well-illustrated work that was eight years in the writing, emphasizes the application of basic turfgrass principles to golf course turfgrass culture. In preparing the book, Dr. Beard, Professor of turfgrass science in the Department of Soil and Crop Sciences at Texas A & M University, was assisted by the staff agronomists of the USGA Green Section headed by then-National Director Alexander M. Radko, and by seven golf course superintendents representing the various climatic regions of the United States.

The 660-page hard-cover edition, which contains hundreds of easy-to-read line drawings, graphs, illustrations and photographs, provides a handy reference tool for golf course superintendents, golf club officials, course owners, green committee chairmen, golf course architects, novice golf course workers and student of golf course turfgrass culture.

"The goal was to provide a comprehensive, practical book that can be used by professional individuals in leadership and management positions on all types of golf courses, including private, municipal and public fee facilities," Dr. Beard states in the preface of the book. "It is hoped that the information presented will prove a useful guide and practical reference for the economy, establishment and maintenance of golf course turfs, which in turn will provide optimum conditions for the game of golf."

Turf Management for Golf Courses, published by Burgess Publishing Company of Minneapolis, Minn., is available to the public for \$46.75 postpaid. To order, contact the USGA,

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Dr. Beard is an internationally known turfgrass researcher and educator and has made major contributions through his research on turfgrass stress physiology. Among his honors are National Science Foundation Post Doctoral Fellow, Fellow in the American Society of Agronomy, Meritorious Service Award

Compensation, Cont.

make management aware of his desires so management will know where they both stand. Overpushiness or threats will get him nowhere. Controlled discussion and communication at the right time will produce results. If promises are broken or rewards not forthcoming, then it is time to look for greener pastures.

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Summary: Get the training. Don't take a job that you're not qualified to do. Do the job right. Tell management how you and they stand, then stand up for your right. Come in on budget at all costs. If management doesn't recognize your worth, then you both have a problem.

Research Review, Cont.

plants. Thus, the situation in respect to potassium utilization parallels that of phosphorus and nitrogen in at least one respect. A very large proportion of all three of these elements in the soil is insoluble and relatively unavailable to growing plants.

Potassium exists in the soil in three
CONTINUED NEXT PAGE

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forms which are in a slow but constant equilibrium with each other. These are illustrated as follows:

Relatively Unavailable
(feldspars, micas etc.,)
90-98% of total K

Slowly Available K
non-exchangeable K (fixed)
1-10% of total K

Relatively Available K
(exchangeable K and K in
soil solution)
1-2% of total K

As the readily available potassium is removed from the soil by plant roots or leaching a shift in equilibrium then causes more of it to become available.

* From The Nature and Properties of Soils by Buckman and Brady.

According to George McNew, in the United States Department of Agriculture yearbook, Plant Diseases, severe potassium deficiency could interfere with the activity of more than 25 different enzymes. He stated that more plant diseases have been retarded by the use of potash fertilizers than any other substance, perhaps because potassium is so essential for catalyzing cell activities. He further stated that the balance of nutrient elements may be more important than concentration of total fertilizer when plants are exposed to attack by parasites. A deficiency or surplus of any one element often promotes diseases.

Drying decreases the solubility of potassium where as aeration increases the uptake of potassium by plant roots. Plants tend to take up soluble potassium far in excess of their needs if sufficiently large quantities are present. This tendency is termed "luxury consumption". A certain amount of this element is needed for optimum growth and this is termed "required potassium". All potassium above this critical level is considered as a luxury, the removal of which is decidedly wasteful.

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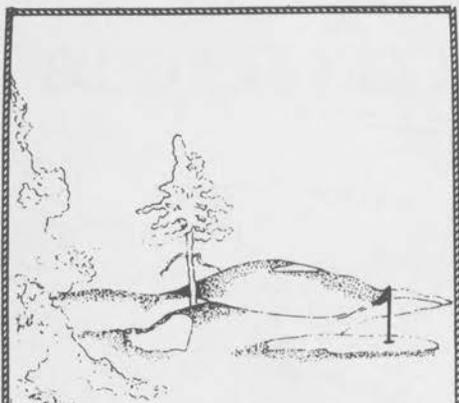


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Research Review, Cont.

One very important suggestion that is apparent from the information known is that frequent light applications of potassium are usually superior to heavier and less frequent ones. Such a conclusion is reasonable when one considers the luxury consumption by plants, the ease with which this element is lost by leaching and the fact that excess potassium is subject to "fixation" by soils.

Another factor in the correct use of potassium is that of balanced nutrition. This is strongly emphasized in the mentioned article by Dr. Goss and Dr. Gould and also in another California Turfgrass Culture article, July, 1965) by Dr. Eliot C. Roberts, formerly of Iowa State University now at the University of Florida, has shown that once nitrogen is absorbed and is inside the grass plant it must be assimilated or used in order to have a beneficial effect on plant growth. The use of nitrogen within the grass plant depends on the presence of other nutrients in the proper proportion one to the other and on several other physiological or growth factors. Their studies showed that nutrient unbalance resulted in the development of yellow, chlorotic foliage because although ample nitrogen was available to the plant, it could not be utilized. Plants are slow to readjust from nutrient unbalances.

Excess amounts of certain elements in the soil can affect the uptake of other elements in the soil. This is known as "antagonism". Studies have revealed that an over abundance of potassium, magnesium and sodium can all have an adverse effect on the nutritional status of plants. It has been demonstrated that high phosphorous can cause a zinc deficiency.

When considering nutrient balance it is desirable to maintain adequate amounts to avoid deficiencies while not creating excesses. A clue on how to maintain a favorable balance may come from what information is known for Southern California areas, a ratio of: 4 parts nitrogen (N), to 1 part P₂O₅; to 2 parts K₂O seems to be somewhere near the correct ratio to maintain for elemental balance.

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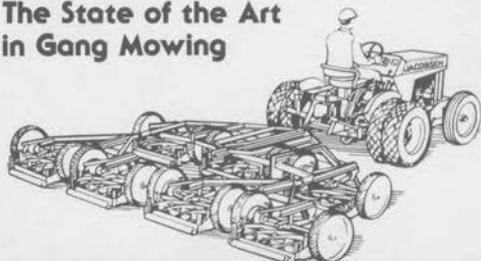
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