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bacteria and returned to be mixed with more air and more sewage. Proper chlorination of this treated waste water will kill more than 99% of the harmful bacteria in the effluent. — Remember I said *bacteria*. The secret to this process is a super saturation of bacteria and air.

Lets discuss the terms associated with waste water.

Sludge — the solid matter that settles to the bottom, floats or becomes suspended in the sedimentation tanks and must be disposed of by filtration and incineration or by transport to appropriate disposal sites.

Primary Treatment — the stage in basic treatment that removes the material that floats or will settle in sewage. It is accomplished by using screens to catch the floating objects and tanks for heavy matter to settle in.

Secondary Treatment — second step in which bacteria consumes the organic part of the wastes. It is accomplished by bringing the sewage and bacteria together in the trickling filters or in the activated sludge process.

Suspended Solids — small particles of solid pollutants which are present in sewage and which resists separation from the water by conventional means.

Now lets get down to the "brass tacks" or basics. What is the effluent or "once used" water really like? First it is an excellent media for growth — a beautiful liquid fertilizer. The water I was working with contains 7.3 pounds of actual N per 1000 sq. ft. per year. This N was 8.1 ppm organic or slow release and 17.5 ppm inorganic or that N that may be taken up faster. Phosphate equals 30 ppm. Potassium equals 104 ppm. Also the water contains sodium, calcium, magnesium, iron, zinc, sulfur, boron, copper and molybdenum. Ph is 7.7. Great stuff — all required elements. Good Ph — Perfect! However there are a few problems:

Salts — May be high — as much as 1000 - 2000 ppm. — be careful — test your water — test your soil — know what is going on. Remember: less than 650 ppm salt useful, 650 -2000 ppm must use periodic leaching, more than 2000 ppm limited usefulness. Also remember least tolerant grasses: Highland, Colonial Bent, Kentucky Bluegrass. Of seven creeping Bents — top growth slowed as salt increased. Arlington, Seaside, Pennlu, Old Orchard — most tolerant. Congressional and Cohansey intermediate. Penncross least tolerant. Also having medium tolerance is perennial rye, tall fiscue and orchard grass. Most tolerant are all the bermudas.

Sodium — may be high — ours was 104 ppm — continuous use of effluent may allow Na to clog clay particles — decrease drainage and could be fatal to some soils. Seaside found to be most tolerant to alkali conditions.

Heavy Metals — these cannot as yet be removed in territary treated water. These may collect in some soils and cause problems. However, this is more a problem in highly industrial areas. Also our calcarious soils precipitate out some of these therefore causing us a small problem, however, these metals end up somewhere in our world.

Last and by far the most apparent and troublesome is algae growth. Our water fresh out of the plant looked like tap water. Of course if you drink it, you are going to be very busy for awhile for it actually would be a "dose of salts". As

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soon as this water is exposed to sunlight we have a tremendous bloom of algae. I have seen it 6 - 8 inches thick floating on the surface. It clogs valves and sprinklers. It smells and feels greasy. It dies and floats to the surface as a dark brown heavy froth and it was mine, and it will be your job to convince your employees and players that it is algae and not something else. However everything is not what it might appear to be and that reminds me of a story. — Chicken hawk story - Lark, Dove, Duck-(Drake).

This brings up another problem and that is people. People and their opinions. Many feel effluent is dirty. Course employees don't like to work in it. Players are very sensitive to getting water on their clothes. There may also be problems with uninformed people drinking out of sprinklers and we already know where he is going to spend some time. Seriously, those working with effluent should keep up on all immunizations because as we said before, chlorine kills bacteria, it does not to my knowledge kill virus. Nothing that is available today kills all virus. If we could discover this procedure, I am sure we would have the cure for the common cold.

Effluent is here to stay; It should be used!

California law AB 1784 (papan regulation) Section 13550 of California's western code makes it illegal to use fresh water on a golf course if effluent is reasonably available. Now convince me, we as superintendents are not going to have to live with it and learn about it. Some solutions to our problems have been: Dual water systems may be necessary for greens — one system effluent and one system fresh water to be used to leach out salts, sodium (after calcium applications) and heavy metals. Leaching rule: 6 inches water to remove ½ salts in 1 foot soil — 24 inches water to remove 9/10 salts in 1 foot soil.

Algae — Do not allow the effluent to stand in the sun. Allow no exposure to the sun. Take the water out of the plant straight into the irrigation system or into a closed tank. Also add strainers or sand separators to the system as insurance. Use "dirty water" irrigation parts. There are some available on the market.

Another aspect is education. The people associated with the course must be educated. They must be convinced on the use of effluent. Remind them that grass purifies. 60% of the water used returns to the environment pure. An 18-hole golf course, if watered 1 inch can absorb four million gallons of water. Remind them that grass produces oxygen. One acre produces enough pure O^2 for four people for one year. And 18-hole golf course produces enough for the life support of 1,000,000 people and it is clean and pure.

Then after all this you might want to write a letter to Santa Claus expressing your desires. Maybe it should go something like this:

Dear Santa Claus:

Please leave me 18 greens that will be proof against wear and tear, disease, bugs, unreasonable players and other pests. Please leave at Tom Smith's house: one durable soft rubber putter which may be cast violently on the ground without injuring the turf on my greens. Please leave at Ed Jone's house one digging fork and a spade in order that he may have something to dig with in his back yard to satisfy his craving for digging and thus relieve the strain on our tees. Please leave some message of inspiration with the Royal and Ancient and the USGA which will encourage them to adopt a new cup with a diameter of at least ten feet so that in the future it may be feasable, if there are any missed putts, to blame them on the player rather than on the superintendent. Please leave your message of good will firmly fixed in the haughty hearts of our members and make it last at least for many months and make it possible for the superintendent to actually enjoy his work within a month after he found it necessary to close the course for a single day.

If you will do all this dear Santa, you need not visit my house. We'll take care of the kids this year.

Humbly yours,
The Superintendent

Thank-You

Editor's Note:

Bob Sanders, CGCS is the Golf Course Superintendent at the Skyline Country Club, Tucson, Arizona.

Our thanks to Bob and the other fine people who keep sending us first rate articles to keep "The South Florida Green" No. 1 in Turf Publications.

We try to print only first run articles and we welcome any topic that a turf related person would like to share with our readers.

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PROFESSIONALS AT WORK FOR YOU

TEE TO GREEN

Dr. B. J. Johnson

By DAVE BAILEY

The following is an interview with B. J. Johnson. He is an associate professor of agronomy with the University of Georgia. He was the education guest speaker at the July meeting of our association.

Question: What area is your research work?
Johnson: I deal primarily in herbicide treatment.

Question: What is the best new herbicide chemical in the last ten years?
Johnson: The best product researched and now on the market in recent years is Metribuzin. (4-Amino-6-(1,1-dimethylethyl)-3-(methylthio)-1, 2, 4-triazin-5(4H)-one

Question: This active ingredient translates into what product trade name?
Johnson: Mobay Chemical Corporation calls their product SENOR. Dupont Chemical Corporation calls their product LEXON.

Since only Mobay is actively selling their product from this point on in the discussion only Sencor will be referred to. Sencor is a 50% wettable powder herbicide.

Question: When did you first start working with Sencor?
Johnson: In 1973, it was labeled in Florida and Georgia in 1978.

Question: Where has your research been done?
Johnson: On test plots and at seven golf courses over a three year period of time. The location is about forty miles south of Atlanta.

Question: Upon what weed is Sencor most effective?
Johnson: Your greatest problem weed, goosegrass and crowfoot.

Question: What application rate is giving the best results?
Johnson: Remember the best rates mean weed killing with as small amount of damage as possible. To achieve this goal the best test results are as follows. Mix MSMA (monosodium acid methanearsonate) and Sencor. On a one acre basis use 2.0 pounds active ingredient MSMA and 1/8 pound active ingredient Sencor.

Remember this means ACTIVE ingredient. That will become a tank mix of 1-2/3 quart per acre of MSMA if you use 6.0 active MSMA. The total ingredient of Sencor product from the bag would be 1/4 pound or 4 ounces per acre. Higher rates of Sencor have been used in the past when not mixed with MSMA. If EPA takes MSMA off the market we may be left with Sencor as our base material.

Question: Do you use a sticker?
Johnson: If you can afford to do so. The work I have done shows no improvement with a sticker since MSMA has some. But I never get a Florida style summer rain. The important time factor is to get about four hours absorption after the spray application.

Question: What is the time interval between applications?
Johnson: Seven to ten days works best.

Question: How many applications?
Johnson: Generally two applications will be sufficient.

Question: After the weeds are killed off and the next generation occurs when should you spray?
Johnson: As soon as the turf is healthy. Here you will need to make your own good field judgement for south Florida. Fertilize weak areas then spray once and evaluate timing from there. Remember herbicide programs are only effective if you continue to keep your turf healthy. Dead areas do no one any good.

Question: Another product of great interest in south Florida is BASAGRAN herbicide, can you give us any data on this subject?
Johnson: Yes, I started working with it also in 1973 and like Sencor it received a label in 1978. Basagran is the trade name for BASF Wyandotte Corporation. The active ingredient is sodium salt of bentazon.

Question: Upon what weeds is Basagran most effective?
Johnson: Basagran is aimed at the nutsedges with better results on yellow than purple.

Question: What rates give best results?
Johnson: One to one and half quarts per acre.

Question: How many applications?
Johnson: Many times two applications are needed.

Question: When can Basagran be applied?
Johnson: Basagran is very selective on sedges in bermuda greens. It can be used all year with no bermuda damage.

Question: What is the best herbicide for Poa Annua in our area?
Johnson: Kerb 50% wettable powder gives the best results

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on bermuda grass and is very selective. It is a product of Rohm and Haas, the active ingredient is 3, 5-dichloro-N-(1,1-dimethyl-2-propynl)-benzamide.

Question: We often criticize researchers for working only on test plots what is your comment?

Johnson: We do hear that often, that is why I worked with Sencor for three years on seven golf courses.

Question: What is your main message to us?

Johnson: Often chemical salesmen are to influencial on rates and not on purpose. Always use test plots yourself. Do not spray the entire golf course and then be sorry. It is very important to keep good records on all your spraying. Local people need a good current education on weed killing. Always understand your rates and keep good calibration of application. Our work is only as good as your application.

HOOKS AND SLICES

The salesman mentioned that he'd got three orders so far that day: "Get out. Stay out. And don't come back."

•

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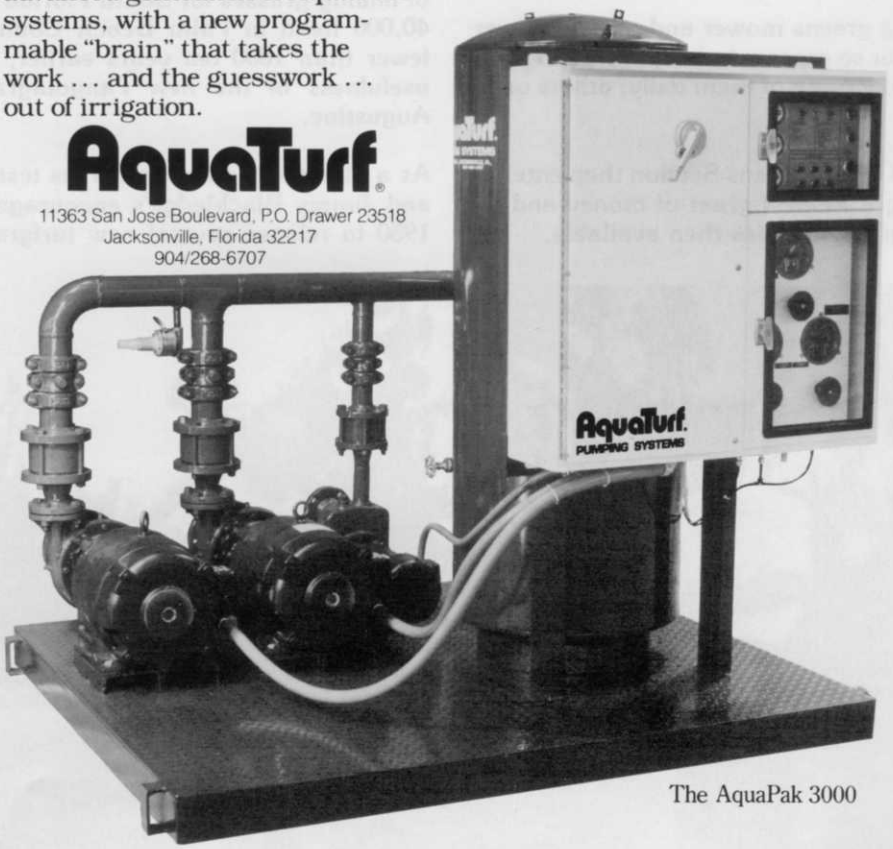

The AquaPak 3000

Jimmy Blackledge Motivated Turfgrass Research in Florida

By DR. ROY A. BAIR

Dr. Bair

Jimmy first visited the Everglades Experiment Station branch of the University of Florida at Belle Glade in 1946. At that time we had some 1700 grasses and legumes from all over the world planted in 10 × 5 ft plots. Although these had been acquired primarily to find plant species which would put South Florida in the cattle business, Blackledge pointed out that many of the grasses were low growing types which ought to be mowed and evaluated for lawn and golf course usefulness.

When he then donated a greens mower and a park mower we replanted a hundred or so grasses in a separate turfgrass nursery and began to mow some of them daily, others once a week.

Dr. Fred V. Grau of the USGA Greens Section then entered the picture by extending a modest grant of money and by sending us all the bentgrass varieties then available.

By 1950 we had a total of 408 grasses in our plots under a regular mowing schedule. These included 120 bermudagrass strains, 60 bents, 20 zoysias, 17 St. Augustinegrasses, and 11 bahias. The large number of bermudagrasses was the result of our spending many self-financed weekends visiting golf courses to look for volunteer strains of the seeded grass which appeared to be "different".

By this time we had also accomplished our primary mission of finding grasses for South Florida cattle. There were now 40,000 head in Palm Beach County, as contrasted with fewer than 1000 ten years earlier, mostly because of the usefulness of the new Pangolagrass and Roselawn St. Augustine.

As a direct spin-off of the grass testing program for cattle, and Jimmy Blackledge's encouragement, we were able in 1950 to release several new turfgrasses which for a time

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March, 1946. James L. Blackledge and Dr. Roy A. Bair at Everglades Experiment Station, Belle Glade, Florida, standing on land planned for more turfgrass experimental plots.

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were improvements on the old Arizona seeded bermudas:

For lawns
- Roselawn St. Augustine
- Paraguay Bahia

For golf courses, bermudas
- Greens
  - Everglades 1
  - Everglades 3
  - Bayshore
- Fairways
  - Ormond

Several years later Gainesville released one of the St. Augustine bitter blue accessions from our Belle Glade nurseries, giving it the name "FLORATINE". We obtained this in the mid-forties from the Blossom Estate in Palm Beach.

Several "Firsts" may be of historical interest:

1946. The first ANNUAL TURFGRASS FIELD DAY was held in Belle Glade at the experimental grass nurseries in October.

1946. Before 2,4-D was given this abbreviated name we reported killing creeping charlie (matchweeds) and water hyacinths with it — the first use of this herbicide in Florida.

1947. TROPICAL TURF TIPS, probably the first monthly turfgrass publication in the U.S., was instituted in March. An amazing 89 of 100 golf course superintendents who got this first edition wrote to request their names be put on a mailing list. Three months later this list had grown to 300.

Turfgrass observational plots at Everglades Experiment Station, Belle Glade, 1947.

Strains of Bermuda Grass at the Everglades Experiment Station, Belle Glade, 1947. Left to right: St. Lucie, Davie strain from Davie, Fla; giant strain from Clewiston, Fla.; fine leaf strain from Key West, Fla.; fine leaf selection.
Soil Conservation Service Photo by Paul Tabor

1947. The First Annual Turfgrass Management Conference was held in Miami Beach in May. Subsquently these yearly meetings were held at St. Petersburg, Jacksonville, and Palm Beach.

1947. At the Indian Creek Country Club, Miami Beach, 206 grasses were planted in observational plots. Several bentgrass varieties lived over two years here.

1948. Before ALDRIN insecticide production was assumed by Shell Chemical, and even before it was named, we reported that on a tee infested with mole crickets at the Belle Glade 9-hole golf course, crickets were killed daily for 30 days following treatment.

1949. At Johnny Schabinger's Palm Beach Golf Club, we reported that TERSAN fungicide gave us more protection against Rhizoctonia fungus on ryegrass winter greens than did four other chemicals tested. We got the same results on the golf course at Belle Glade.

1950. Ammonium sulphate trials on greens at Belle Glade gave slightly better growth responses than did sodium nitrate, uramon or ureaform nitrogen.

Soluble fertilizer applied through greens irrigation proved fully as satisfactory as solid fertilizer applications.

1950. Test plots of up to 100 of the more promising turfgrasses had by now been established also at Ponte Vedra, a cemetery in West Palm Beach, and at branch experiment stations of the U of F at Homestead, Sanford and Leesburg.

ONE REGRET

We released ORMOND bermudagrass because of its immense vitality. If we had known how it would invade greens after planting only on fairways, we would probably have suppressed it.

Possibly 100 superintendents will attend the funeral of this investigator for the purpose of standing in line for the opportunity of planting Ormond on his grave.

FLORIDA GOLF COURSE SUPERINTENDENTS ASSOCIATIONS

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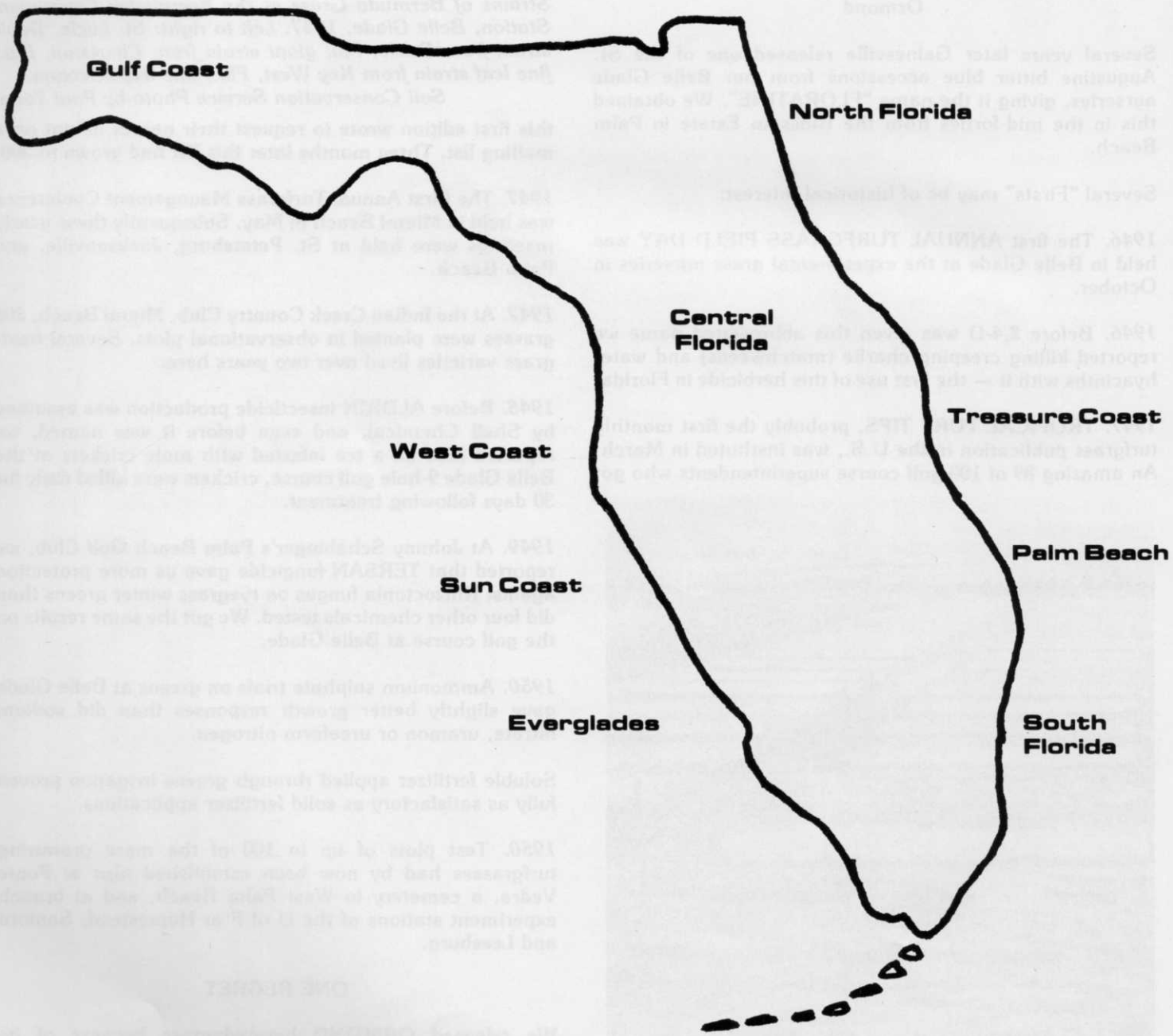

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