To the floating deck Crew King, this is a walk in the park.

Available in 36" and 48" cutting widths.

Fixed deck units also available.

Heavy duty 10 gauge decks with 7 gauge skirts.

Rigid bumper system on fixed deck units.

Powerful, 14 HP Kohler overhead valve, 4 cycle engine on floating deck models.

Reliable, 12.5 HP Kawasaki engine on fixed deck models.

Large, 4.25 gallon fuel tank to minimize refueling time.

> Top-lube, easy-access blade spindles for simple maintenance.

Low profile, heavy duty caster struts for better access under bushes and benches.

Long life, smooth casters for less turf marking.

Double-A drive belts for better traction.

Neutral starting safety controls.

Floating decks have wide reinforcing bar on deck perimeter for strength and to prevent turf gouging.

48" deck model has a center anti-scalp roller and skids for added turf protection.

Smooth out your tough jobs with the new 36" and 48" Crew Kings.

For a better quality cut, a floating deck is suspended from the carrier frame, allowing the Crew King to follow ground contours closely and prevent scalping and blade damage.

For better productivity, the new Crew Kings are packed with time-saving features. Quick change cutting height adjustment requires little effort and no tools. Just pull a few pins, set the cutting height and continue.

Five forward speeds accommodate a wide variety



of mowing conditions. Reverse gear makes access to tight areas easier, including trailer unloading. And a zero turning radius at the wheel provides excellent maneuverability without scuffing turf.

Crew Kings also have proventough Jacobsen decks, built to take the hard knocks of everyday work.

The new Jacobsen Crew Kings help turn any day into a walk in the park.

See your Jacobsen Commercial Products dealer today for a demonstration.



Dr. Beard views future of turf management

Dr. James Beard outlined 10 trends he felt vital during a presentation at the Michigan Turfgrass Conference, just a few miles from Michigan State University where he taught from 1961 to 1975.

"Some of the things I say will probably be wrong, but the challenge is to think of the future," said Beard who was visiting from Texas A&M University.

1. More computer use in turfgrass management. "You're going to come in and turn that computer on and you're going to get a series of readouts that there is a high probability of this disease in the next four days, or the prime time for winter overseeding is coming up, or a period of root stress is approaching," he notes. Computers, networked to libraries, will provide an immediate source of information for turfgrass managers.

2. Reduced pesticide use. More corrective and fewer preventive applications. More pesticide applications will be targetspecific.

3. More emphasize on pest management approaches. The key to solid turfgrass management?-"understanding and manipulating the environment in favor of the growth of the turfgrass plant, and minimizing the chances of stress," says Beard.

water available for turfgrass use, higher water costs, increased use of effluent water, government control or allocation. says Beard, noting that the industry has had a hard time convincing the public that

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Beard: Predicts more tolerant turf.

turfgrass is actually vital in preserving and protecting groundwater.

5. More use of controlled-release fer-4. Water conservation. Expect less | tilizer products. The presence of nitrates in groundwater will continue to be an issue. He asks for improvements in slowrelease fertilizer carriers.

6. Less energy waste. Expect steadily rising costs for petroleum-based products and internal combustion machinery, causing turfgrass managers to plan their programs with energy savings in mind.

7. Improved stress tolerance in turfgrass cultivars. Plant breeders will accelerate their efforts to develop grasses that provide quality turf while requiring less energy, water, fertilizer, and pesticides.

8. Innovative rootzones for turfgrass getting lots of traffic. Beard refers to a mesh element system in place in the upper six inches of turfgrass rootzone at the 14acre Santa Anita (Calif.) Race Track. He said it significantly reduced divoting and improved turf at the track. Systems based on similar principles might be developed for golf tees/greens and sports fields.

9. Growing focus on employee safety. Employee training programs will focus on safety practices, use of equipment, product safety, etc.

10. More education needed to keep abreast of technological advances. Turfgrass managers will have to be well versed in turfgrass, and also in cost control, system organization, personnel management, budgeting, etc.

The heart of his message? "Efficiency through better management of water use, pesticide use, energy use, equipment use, labor use, and fertilizer use," says Beard.

-Ron Hall

High vs. low volume: still sparks controversy

 Maybe you can still spark a hot little argument concerning liquid versus dry lawn applications.

Maybe.

Or how about high volume versus low volume?

Consider this instead: a separate company, a low volume or granular company. in addition to your present company? Perhaps you can even retrain and staff the new venture with some of the same personnel you already employ?

Bruce Jacobs, an agronomic specialist with DowElanco, posed the questions during a presentation at the Michigan Turfgrass Conference.

Jacobs cautioned, however, that before making any significant changes in an operation business owners should satisfy themselves that they can answer the following three questions:

1. Will the change improve the company's long-term profitability?

2. Will the change improve employee motivation?

3. Will the change improve the company's service to its customers?

Until just recently-into the 1980s. really-the public embraced high volume liquid applications at least in part, claims Jacobs, because the service was new and novel



Bruce Jacobs: weigh longterm profit picture when considering liquid vs. dry.

"People said, 'Hey, I can't do that. Hose down my lawn next'," says Jacobs of the first professional applicators, some of whom used converted oil tank trucks and put down as much as 10 gallons of material per 1,000 sq.ft.

"Now I think the homeowner is saying, 'Give me the service because I don't have continued on page 84

A breakthrough in fertilizer performance and value.

SCOTTS \circledast Poly-S $_{\infty}$ technology encompasses a family of controlled-release fertilizers that offer you the performance of advanced polymer coating technology at a price comparable to traditional sulfur-coated urea (SCU) fertilizers.

What makes Poly-S technology revolutionary is a unique multiple coating system that determines the rate of nutrient release while improving handling and application of the fertilizer.

Each Poly-S particle consists of a highquality nutrient substrate core coated with a layer of sulfur. The particle is then encapsulated with a proprietary polymer that protects the nutrients and, in combination with the sulfur layer, determines the rate of release, which can be regulated by varying the levels of each of the coating components.

The Poly-S process actually requires less total coating than with SCU products, providing higher nitrogen analysis. And it's less sensitive to temperature than fertilizers coated with polymer only.

The durability of the Poly-S coating protects the nutrients

without the need for the waxes and conditioners often used to mask coating imperfections in traditional sulfur-coated products. So there's no dust problem and no wax residue on spreaders — increasing the convenience and accuracy of application.

Poly-S technology also makes the fertilizer granules more abrasion-resistant than SCU, so that they are applied to the turf with the coatings *intact*, virtually eliminating the chance of premature release of nitrogen leading to surge growth and turf damage.

No other fertilizer offers you so much residual flexibility with the economy of Poly-S technology. And all Poly-S fertilizers come with a Scott Tech Rep, an agronomically trained professional ready to help you develop a total turfgrass program that assures proper applica-

tion and maintenance scheduling. For more information about Poly-S fertilizers and their performance advantages, contact your Scott Tech Rep. Or call 1-800-543-0006.





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HIGH VS. LOW VOLUME

Advantages of high volume:

- One-step application. You can mix products in the tank.
- Excellent to good coverage of the lawn.
- Less chance for phytotoxicity, streaking.

Disadvantages of high volume:

- x Large, heavy trucks.
- x Hard to operate in downtown areas, lack of mobility.
- x In event of spill, potentially more material to contain.

Advantages of low volume:

- Smaller, easier to operate, easier to keep up vehicles.
- Better mobility.
- Fewer gallons of material on the road.

Disadvantages of low volume:

- x Generally demands more experienced applicators.
- x Greater likelihood of phytotoxcity and streaking by technicians.
- x Spills are usually of more concentrated material.

High vs. low from page 82

time to do it for myself," says Jacobs.

Jacobs says the lawn application industry is moving toward low volume (1 to 1-1/2 gallons per 1,000 sq.ft.) and granular programs, but some high volume liquid operations are still profitable and healthy.

So instead of stripping off the tanks from your big chemical trucks and selling them as flatbeds, or reinventing the company image, he suggests, start another operation, maybe even with a different company name and different image in the marketplace.

then with SCU products; providing higher

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as our new cold tolerant turf type bermuda – Cheyenne. With basic production in every major grass seed region in the country, Pennington can provide you with the correct grass seed for any application and the dependable service that you need. If so many different types of grasses leaves you uncertain about

which one is best for your needs, just give us a call. Pennington has over forty years experience in the grass seed industry with a technical staff that can solve your toughest turf grass problems.





HOT

Weight of evidence' favors 2,4-D

WASHINGTON—If several studies have shown that the herbicide 2,4-D is linked to cancers in both man and dogs, then why is it still on the market?

Simple: *much* more evidence suggests that exposure to the popular herbicide does not cause cancer, says Dr. George Carlo from the Health & Environmental Sciences Group, Washington D.C. The herbicide is the most intensively studied chemical of its kind.

And it's one of the most widely used herbicides with about 55 million pounds being applied a year in North America, most going to agriculture but almost 7 million pounds on turfgrass.

The 2,4-D/cancer hypothesis first surfaced in 1977 when the Swedish scientist Hardell suggested it *might* be linked to three rare forms of cancer. But the bigger bomb fell in 1986 with the publication of the Kansas Farm Worker Study.

Yes, that study said, there does appear to be a connection between 2,4-D and a form of cancer known as non-Hodgkins lymphoma. It claimed that farmers who had more than 21 exposures a year to 2,4-D appeared more likely to develop the cancer.

Many researchers now feel, however,

More 2,4-D data is expected this year

MIDLAND, Mich.—As many as 500 concerned dog owners jingled the 2,4-D hotline (1-800-345-5109, U.S., or 1-517-835-2091, Canada) after the media ran the results of a study linking 2,4-D exposure with canine lymphoma last summer.

"There were more calls that I couldn't answer because the line was busy," says Dr. Wendell R. Mullison, who mans the hotline.

Although Mullison, one of the developers of 2,4-D, admires what the researchers tried to do, he—and others—point out serious shortcomings in the study, weaknesses that cast doubts on some of its conclusions (see Nov., 1991 LM, page 44). But of course, the press has already generated what excitement it could from the findings.

And some of the public (landscape pros wonder how many) question the safety of the herbicide.

More data on 2,4-D is on the way. Several studies that will shed additional light on pesticides, specifically the herbicide 2,4-D, may be published in the coming months.

The lowa/Minnesota Study—Dr. Kenneth Cantor of the National Cancer Institute (NCI), Washington D.C., is the principle author. He tells LANDSCAPE MANAGEMENT that this case control study of farm workers might be published in the journal *Cancer Research* by late spring or early summer. The study looks at incidences of leukemia and lymphoma in connection with certain farm practices in the two states.

The ChemLawn applicator exposure study—This study is probably more than a year away from being published, says NCI researcher Dr. Sheila Zahn. This is a cohort study investigating the chemical exposures and health histories of about 35,000 ChemLawn applicators. The exposures can be determined through records ChemLawn made available to researchers.

"These two studies will provide more data that will fit into a larger mosaic of data," says Gary Hamlin, representing

INSIDE



Gary Hamlin says each study adds to 40-year data base of herbicide.

DowElanco, a manufacturer of technical grade 2,4-D.

"It's kind of like putting together a jigsaw puzzle. You don't assume the next piece you use is going to show you the whole picture. No single study, and certainly in the area of epidemiology, tells the story," he adds.

Meanwhile, manufacturers, formulators and marketers of 2,4-D continue the multi-million dollar defense of the herbicide, which is in the lengthy process of EPA re-registration.

More info on 2,4-D research, p. 90

Water charter in California, p. 92 Golf course mower surveys, p. 94

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2,4-D exposure study encouraging

GUELPH, Ontario, Canada—Green industry professionals should be encouraged by the findings of a Canadian 2,4-D exposure study.

Researchers at the University of Guelph and the Canadian Centre for Toxicology biologically monitored volunteers either exposed to 2,4-D, or in the vicinity of applications of the herbicide.

They failed to find exposures in any subjects above the acceptable daily intake established by the World Health Organization.

A summary of the soon-to-be pub-

lished study appeared in the January issue of *ProSource*, a publication of the Professional Lawn Care Association of America (PLCAA).

HOT TOPIES

In that summary, researchers Shelley A. Harris, Keith R. Solomon and Gerry R. Stephenson said they measured exposures received by home gardeners, professional applicators and bystanders. Also, levels of 2,4-D were monitored in air samples both inside the home and downwind of the application site.

They said the results of their study "indicate exposure to sprayed turf should present little risk in humans."

Even so, they said people can further reduce exposure, even to the nondetectable level, by staying off treated turf for at least 24 hours, or until after rainfall or irrigation.

The study also reaffirmed the role of protective clothing in reducing application exposure.

The herbicide 2,4-D typically enters the body through the skin—very little through inhalation—and is rapidly excreted in the urine. It is not metabolized in the body and leaves as it entered,

that the methodology used in that particular study, and in the recent work linking canine cancer to 2,4-D, does not tell the whole story..

"The weight of evidence does not support the hypothesis that 2,4-D causes cancer," says Carlo, adding that seven different studies conducted in four countries "did not support the hypothesis."

This evidence, most of it gathered since 1980, has been reviewed by several independent government and academic bodies.

A long history—Indeed, an incredible amount is known about 2,4-D, which was developed in the early 1940s, made commercially available in 1947 and is still widely used today because of its effectiveness and low cost.

The major route of 2,4-D exposure to humans is through their skin, says Carlo. But 2,4-D is not metabolized by humans, nor does it build up in the body. Carlo says it's excreted from the body, usually without a trace, within three days.

Beyond that, exposures experienced by applicators in the work-a-day world assuming they follow product safety instructions—"are real, real low," says Carlo.

Igniting the press—Even so, a connection, *any* connection, between 2,4-D and cancer seemingly always ignites an immediate reaction in the press—a reaction invariably directed against professional lawn applicators.

Carlo says the 1986 Kansas Farm Worker Study resulted in "a lynch mob coming after 2,4-D."

The most recent incident, the 1991 study speculating that dogs exposed to 2,4-D (apparently as the result of lawn applications) were more apt to develop cancer,



Dr. George Carlo, left, explained the latest 2, 4-D controversy to applicators gathered at a symposium in Columbus,

received immediate and widespread publicity, even though the study's authors cautioned against drawing too many conclusions from their results.

"Why was the dog study published: because it was the first of its kind," says Carlo. "And the media ran with it."

However, when a 1990 Nebraska farm worker study purported to establish a tenuous link between repeated exposure to 2,4-D and cancer, it didn't create the same controversy as other reports.

"Millions of dollars were spent between 1986 and 1989 to put the issue in perspective and by the time the Nebraska study came out, there was just a thud," Carlo claims.

Carlo, who describes himself as both an epidemiologist *and* an attorney, says 2,4-D is the most exhaustively tested product of its kind. "We have both an animal and a human data base," he says.

-Ron Hall

Congress extends tax credit rules

> **WASHINGTON**—Small business owners across the country received good news in December: the United States Congress extended five important tax credits before taking its winter recess.

> According to a news release from the American Nurserymen's Association, small businesses can benefit from the new credits through June, 1992.

These tax credits apply to:

Health insurance for the selfemployed—Tax-payers can deduct 25 percent of health insurance costs for themselves, their spouses and their dependents.

Targeted jobs—If you hire personnel from certain target groups, you are eligible for another type of tax credit.

Energy investment—If you have solar or geothermal heating equipment at your place of business, you can receive a 10 percent credit.

Employer-provided education benefits—You can credit up to \$5,200 of gross income for tuition and related expenses paid by the employer. This does not include graduate-level courses, though.

Research and development—For details, check with your accountant.

The A.A.N. urges small business owners to check with their accountants before filing 1991 taxes (remember the deadline: April 15th!) for further information.