Table 5. Average Total Cost by Size of Farm and Level of Integration, Maryland, 1976

Production Option	No Harvest	Harvest Option (Including Sales and Administrative Costs)[a]			Transportation Option
		Hand-Directed Hand-Rolled	Tractor-Powered Hand Rolled	Palletizer, Palletized Handling	
	cents/yd²	cents/yd²	cents/yd²	cents/yd²	
Purchase by the Acre[b]	——	27.574	27.082	26.730	f.o.b. farm
	——	38.343	37.851	37.499	Method I
	——	36.872	36.380	36.028	Method II
Produce Less Than 100 Acres	13.481	26.770	26.278	25.926	f.o.b. farm
	——	37.539	37.047	36.695	Method I
	——	36.068	35.576	35.224	Method II
Produce 100-150 Acres	11.620	24.909	24.417	24.065	f.o.b. farm
	——	35.678	35.186	34.834	Method I
	——	34,207	33.715	33.363	Method II
Produce 151-300 Acres	10.878	24.167	23.675	23.323	f.o.b. farm
	——	34.936	34.444	34.092	Method I
	——	33.465	32.973	32.621	Method II
Produce Greater Than 300 Acres	12.161	25.450	24.958	24.606	f.o.b. farm
	——	36.219	35.727	35.375	Method I
	——	34.748	34.256	33.904	Method II

[a]Sales and administrative costs were 4.501 cents per square yard of harvested turfgrass.

[b]In lieu of production costs for those not producing turfgrass, the average price of $657.09 per acre for unharvested turfgrass was used in the cost calculation.

of production, thereby decreasing returns to management to less than that earned on the larger farms if all farms received the same price.

Return to management for various farm sizes, methods of harvest, methods of transportation, as well as the option to purchase turfgrass by the acre for later harvest and delivery is presented in Table 6. In determining the return to management, gross receipts for f.o.b. at the farm were based on a harvest of 4,600 square yards per acre and a harvest price of 55.3 cents per square yard. The price for delivered turfgrass was 70.8 cents per square yard. Purchase by the acre costs were based on the reported average price of $657.09 per acre for unharvested turfgrass. The other costs, other than management, were based on information in Tables 1-4 plus sales and administrative costs of 4.501 cents per square yard of harvested turfgrass. These costs are summarized in Table 5.

Table 6 shows that return to management ranged from a low of 28.530 cents per square yard on farms with less than 100 acres selling turfgrass f.o.b. at the farm (hand-directed harvest) to a high of 38.179 cents per square yard on farms with 151-300 acres where the palletizer was used to harvest and Method II was used to deliver turfgrass. **WTT**

(Table 6 is located on page 54.)


KUBOTA L185

How to buy the right tractor.

It's easy to buy a tractor. You go to a dealer. Pay him some money. He gives you a tractor.

Buying the right tractor is another matter. It's not hard to do. But there are a couple of important things to keep in mind.

YOU DON'T EAT SOUP WITH A FORK.

And you don't need a 100 horsepower tractor to raise vegetables, move some dirt on your farm, or landscape your yard. The prime consideration in buying your tractor is to get the right one for the job you have to do.

KUBOTA. THE MID-SIZE TRACTOR.

We are the world's leading manufacturer of mid-size tractors. In fact, that's all we make. We don't make giant tractors. Nor do we make garden toys. Kubotas are just right for your lesser jobs that still require the power and versatility of a real tractor. So even if you already own a 400 acre spread and a couple of heavy-weight tractors, you probably still have a place for a mid-size Kubota.

THE DYNAMIC DIESELS.

If you don't want to lavish a lot of attention on your tractor, Kubota's a good one for you. All Kubotas have water-cooled diesel engines. Diesel engines have no electric ignition system, and they never require a tune-up. This means service is reduced to a bare minimum. Which brings us to another of our strong suits. Economy.

HOW TO SAVE MONEY.

Running a Kubota diesel engine costs a lot less than what it would cost to run a comparable gasoline engine. And a 12 to 47.5 horsepower Kubota is going to burn up a lot less fuel than a larger machine.

Your Kubota dealer is the right man to tell you which Kubota suits your needs best. Which Kubota implements you should have. And whether you need 2- or 4-wheel drive.

Then there's only one thing left to do. Take our tractor and put it to work.

We're looking for work.

HOLD IT! Before I rush off and order a Kubota tractor, I'd like to have a free copy of your Kubota brochure. Please send one quick.

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Kubota Tractor Corporation
300 West Carob Street, Compton, CA 90220

NAME

ADDRESS

CITY STATE ZIP

AREA CODE TELEPHONE NUMBER

WTT-10

KUBOTA®

Kubota L-185 tractor (17 h.p.) shown with mid-mount mower.

Table 6. Return to Management from the Sale and Transportation of Harvested Turfgrass by Alternative Methods of Production, Harvest and Transportation, Maryland, 1976[a]

Production Option and/or Size	Method of Harvest: Hand Directed, Hand Rolled	Method of Harvest: Tractor Powered Hand Rolled	Method of Harvest: Palletizer, Palletized Handling	Transportation Option
	cents/yd²	cents/yd²	cents/yd²	
Purchase by the Acre	32.457	32.949	33.301	Method I
	33.928	34.420	34.772	Method II
Produce Less Than 100 Acres	28.530	29.022	29.374	f.o.b. at farm
	33.261	33.753	34.105	Method I
	34.732	35.224	35.576	Method II
Produce 100-150 Acres	30.391	30.883	31.235	f.o.b. at farm
	35.122	35.614	35.966	Method I
	36.593	37.085	37.437	Method II
Produce 151-300 Acres	31.133	31.625	31.977	f.o.b. at farm
	35.864	36.356	36.708	Method I
	37.335	37.827	38.179	Method II
Produce Greater Than 300 Acres	29.850	30.342	30.694	f.o.b. at farm
	34.581	35.073	35.425	Method I
	36.052	36.544	36.896	Method II

[a]Method I transports 350-400 square yards of sod and Method II transports 650-700 square yards of sod. Most palletized sod is transported under Method II, but each method can transport either rolled or palletized sod. Returns on farms with 150 acres or less of turfgrass which harvested using the tractor-powered, hand rolled or the palletizer method are believed to be in excess of what could have been earned. In 1976, these farms did not harvest a sufficient volume of turf (at least 42.5 acres and 70.6 acres per machine per year for the two mechanized methods, respectively) to justify the harvesting costs which are implicit in the return to management. Returns to farms in the 151-300 acre range are also believed to be in excess of what could have been earned in 1976. Farms in this group generally produced turfgrass using a less intensive production schedule which would have been sold at a lesser price if it was sold on a harvested basis. Returns to management would thereby be decreased below those reported.

How healthy are your trees?

Are you noticing any of the following?

—Premature leaf drop
—Leaf discoloration, yellowing or chlorosis
—Many broken branches after windy days
—Leaves growing dwarflike & in clusters (Witches Broom-like)
—Stunting or unnatural dwarfing
—Lack of terminal growth
—Die back, dying of branches
—Inability to ward off and/or heal from insect, disease and/or adverse weather conditions.

If you have noticed any of these symptoms, answer this question ———

When was the last time you fed your trees, evergreens, shrubs & perennial ornamentals?

Inadequate nutrition is frequently the basic cause for most of these problems.

Most perennial ornamentals are planted in undesirable soils and are forced to grow under unnatural conditions. This places a great deal of added stress upon these plants.

Now you can help your perennial plants overcome many of these problems and encourage them to become beautiful and healthy by: DEEP-ROOT FEEDING them this fall with AGRO CHEM'S T E S, a complete TREE, EVERGREEN, SHRUB & PERENNIAL ORNAMENTAL PLANT FOOD & SOIL REBUILDER. T E S contains the primary nutrients (NPK), secondary nutrients and micro nutrients (sulfur, iron, copper, zinc & manganese) in the low salt and natural organic polyflavanoid forms that will provide a balanced diet of nutrients while rebuilding and reconditioning the soil. This unique formulation is a liquid slurry mixture containing both soluble and slowly available forms of nutrients. Available in 5-gallon pails.

FREE INTRODUCTORY OFFER

AGRO CHEM'S POLY-JET ROOT FEEDER Automatically mixes & dilutes concentrated T E S Root Feeding materials with water and properly injects them into the root zones.

FREE — Root Feeder with initial minimum order purchase of ten 5-gallon pails. While supply lasts.

Note: Training seminars available in October, November and December 1978, and January and February 1979

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *I have read several articles recommending fall fertilization, yet some of my clients refuse to let me fertilize their trees in the fall since they say the trees aren't growing and the fertilizer is wasted. What can I tell them?*

A: Even though stem or foliar growth may not be evident, the root system of trees can continue growing until the soil temperature approaches freezing. The fertilizer elements are absorbed by the roots and combine with stored sugars to produce all the other necessary compounds for cellular growth and function. Therefore, fall is an excellent time to stimulate an extensive root system which results in a stronger, healthier tree.

Q: *I was recently told not to use Casoron on white pine and Norway spruce, but I looked on the label and found pine and spruce listed. Doesn't that mean it is OK to use?*

A: You must have an old container. Pine and spruce are no longer on the Casoron label. I checked with Thompson-Hayward, basic producers of Casoron, and was told that side applications may cause a buildup of the chemical near the trunk and cause injury to *Pinus* and *Picea* species.

Q: *What is the best method for treating chlorotic pin oaks? I have tried several methods with no results.*

A: Assuming that the leaves are displaying an interveinal yellowing, the cause is probably a lack of available iron. However, other factors can cause similar symptoms, and if the tree does not respond to recommended iron treatments, other possible problems should be considered. Wetwood, a vascular bacterial disease may aggravate an iron deficiency and prevent satisfactory response to treatments.

Trunk injections of dry or liquid iron salts are the most consistently effective treatments for iron deficiency chlorosis. Our tests have shown ferric citrate and ferric ammonium citrate to elicit the best response of the many iron compounds available. In most cases, the response is improved with soil-applied fertilizer.

Trunk injections may have to be repeated in a few years unless the soil problem causing a deficiency of available iron is corrected. Soil applications of iron chelate may maintain a sufficient level of available iron and attempts to improve the soil pH are sometimes successful, particularly if the soil is somewhat sandy. If the trees are irrigated, the pH of the water should also be tested.

Q: *I would like to use a dye this fall instead of overseeding with a cool-season grass. Can I spray it on just before the grass turns brown or will it injure my bermudagrass?*

A: The turfgrass colorants are not phytotoxic to grass if applied according to instructions. However, if you apply it while the grass is still growing, you may end up mowing off the colored leaves. The best policy is to wait until the grass goes dormant.

Q: *When is the best time to seed a heavily shaded area in the Northeast?*

A: Spring. Seed as early as possible to provide the maximum establishment period before the trees foliate. You could also seed in mid- to late November and let the seed overwinter if the area is difficult to work in the spring. Autumn establishment may be difficult because of fallen leaves.

If the area is too heavily shaded to allow turfgrass growth, you may want to consider ground covers.

Q: *I would like to know if liming really helps control thatch.*

A: If the pH of the thatch layer is too acid for the optimum growth and activities of the microorganisms responsible for thatch decomposition, light frequent applications of lime will enhance biological thatch control. Although recommendations vary, a rate of one to two pounds of hydrated lime per 1000 square feet every two weeks has been successful.

It should be remembered that, even though the thatch layer is acid, the underlying soil may be near neutral to alkaline and additions of lime could have an adverse effect on soil reaction.

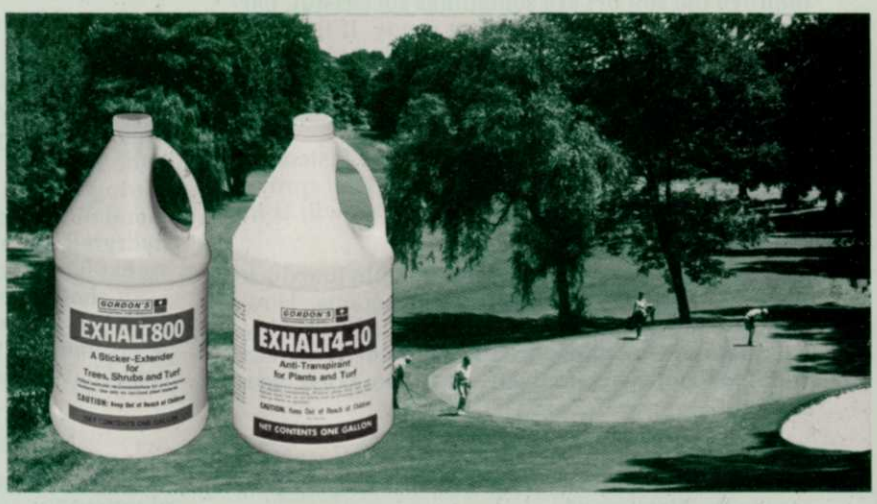
Q: *How do you use herbicides around nursery plantings?*

A: Read the label and apply the herbicides according to instruction *only* to the plants listed.

The herbicide choice is affected by the nursery plant species, the problem weeds, soil type and the application technique and timing that is best for your particular nursery operation. **WTT**

Found: A tested way for you to cut Snowmold control costs 50%

Spray additives Exhalt®800 and Exhalt4-10 can reduce turf maintenance costs sharply by increasing fungicide life and minimizing Winterkill hazards.



Perhaps nothing in the professional turf world is more universally frustrating than the menace of fungus diseases. The battleground is wide and deep, ranging from far north to deep south and encompassing both of the major Snowmold species. Even so, there's little need for gloom.

Because, at last, Exhalt spray additives are blunting the destruction of these insidious diseases wherever they flourish.

The kinds of Snowmold

Pink Snowmold (Fusarium nivale, Fusarium rot, or Fusarium patch) attacks both northern and southern grasses, but it's worse in the south. It ravages turf in late fall, winter or early spring — with or without snowcover. To do their damage, ever-present fungus spores need only ideal conditions. Unfortunately, Pink Snowmold can be destructive under melting snow or at temperatures as high as 80° F

Gray Snowmold (Typhula itoana) — also called snowscald or winter scorch — is a bugaboo both north and south, but it's worse in the north. Snow is not a requisite, but it aggravates the disease. It appears after the first thaw.

For control purposes, the *kind* of Snowmold is inconsequential. What counts is the *efficiency and the lifespan of the fungicide.* The need to improve them prompted the development of Exhalt spray additives. And they're causing a revolution.

Of course, nobody can promise foolproof cures for diseases as complex as Snowmolds. They differ in kind and severity; they're subject to weather vagaries. If there's *one constant* in this fungus jungle, perhaps it's this: *timing.*

The *TIMING* of the treatment is all-important.

And while we can't presume to know the intricacies of *your* disease problems, we can offer some reliable guidelines:

1) *Do not* apply nitrogenous fertilizers in late fall; let the grass "harden off" instead.
2) *Do* remove thatch; it's a fertile breeding ground for Snowmold mycelia.
3) Remember and use these Gordon spray additives:

Exhalt800, which extends fungicide life as much as two or three times.

And **Exhalt4-10,** which reduces plant moisture loss and lessens the threat of winterkill.

As you shall see, they can help you in three important ways.

Snowmold in the North

When the ground freezes, apply fungicide combined with Exhalt800 after the first hard frost, when the growth has stopped. This sticker-extender encapsulates and protects the fungicide against wash-off and weathering. It even stretches and flexes to remain intact even if grass grows during unseasonably warm days.

Finally, when you're sure *all growth* is finished, apply Exhalt4-10 — the "overcoat" that even further guards against fungus attack. Application is at the rate of one gallon Exhalt4-10 to 10 gallons of water.

Snowmold and Winterkill in the South

Here, the problem can be even more stubborn because grass may grow all winter, requiring from one to four fungicide treatments between late November and April. Use Exhalt800 with every spray.

If cold weather stops grass growth, then apply Exhalt4-10, the "overcoat" that minimizes the risk of Winterkill.

If the ground freezes, apply Exhalt4-10 at once to avoid Winterkill. Winterkill is caused by the turf trying to pump ice out of the ground so the grass can transpire. Exhalt4-10, by cutting the "pumping rate" almost 50%, gives your grass a better chance to survive.

Shrubs, too, benefit from the Winterkill protection of Exhalt4-10 — especially conifers that hold their needles in winter. Here the application rate is one gallon of Exhalt4-10 to four gallons of water.

Low-cost protection in any climate

If you've had it with rising fungicide prices, high labor costs, the drudgery of turf repair . . . now you can fight back! First, add Exhalt800. Compared with the alternatives, the cost is miniscule. Add only one pint to 100 gallons of spray. It can double the fungicide control period, reduce material costs at least 50%, and save expensive labor.

Finally, when conditions are right, apply Exhalt4-10 to suppress Winterkill.

Exhalt800 . . . Exhalt4-10 . . . today's best weapons against Snowmold and Winterkill. Get complete information from the man who sells TRIMEC® herbicide and companion turf products — *your local authorized Gordon distributor.*

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 Circle 111 on free information card

Turf management 1979: Why it should start with TRIMEC® applied late this fall

Late fall dandelion control, not feasible before Trimec, today offers year-round benefits only Trimec can provide. Balanced workloads and ideal seasonal timing are two.

For you, the professional turf manager whose work bears the public spotlight, dandelions can be the scourge of the earth. They're ugly. Costly. Time-wasting. An irritant to everyone, both in and out of management. Dandelions — the turf spoilers. They've got to go!

But, before Trimec, the only dependable time to wipe out dandelions was spring — ideally, early spring (which is usually the windiest, rainiest, muddiest spray season of the year). Alternatives? None. Just spray — and let the other work wait.

And spray you did. But not without the knowledge that your gains would be short-lived. Because, in a few weeks, the *second* weedcrop would beg attention — Plantain, sorrel, chickweed, thistle (and more dandelions) — all flourishing because they sprouted too late for your *early* spray.

Obviously, the ideal time for controlling dandelions is late fall. But, before Trimec, you couldn't develop an effective fall program for controlling them, because even the best herbicides lacked cool-weather power.

Then Trimec was invented

Trimec is today's advanced herbicide that lets you wipe out most dandelions, and virtually all other broadleaf weeds, at the ideal time — mid-October to late November — in 50° temperature or cooler. This shifts much of the heavy spring workload to fall, when you have more time. Besides, your spring turf will be almost completely dandelion-free — having a few stragglers at most.

With a *fall* spray, you can skip the *early spring* dandelion treatment. And since you won't have to apply your main weed control until four to six weeks later, you'll have gained a month or more for other management functions — planning, maintenance, training, and so on. *Count the benefits:*

(1) **Late this fall** your sprays likely will encounter less wind, rain and mud than they would in February or March next year. Ornamentals, going dormant, are less prone to drift damage (they won't have spring's tender buds and foliage). Mowing is finished, reseeding completed; you have more time to work with your spray crew. And new grass is mature enough to resist herbicide damage.

(2) **Early next spring** you won't be plagued with that early rash of dandelions — you'll have killed virtually all of them last fall.

(3) **Later next spring,** four to six weeks later, your main Trimec application will get practically all the weeds then growing. Certainly, the timing fits better into your work schedule.

(4) **In all seasons** you can better manage your time for peak efficiency and balance the seasonal workloads, thus improve all of your management functions.

The Trimec formulation makes it possible

It's unique. Patent-protected. More effective, more cost-efficient than any other broadleaf herbicide. The ingredients themselves are not uncommon: 2,4-D, MCPP and Dicamba are well-known. But combined in the exclusive Trimec way their *synergism* (the interaction of the components) releases weedkill power much greater than the sum of their strength when used separately. Thus, even the uncommonly small amounts of Trimec chemicals become highly efficient.

The result is that acre for acre, dollar for dollar, weedkill for weedkill, Trimec costs less than any other herbicide. Field experience and test after test have proved it. Trimec also poses less threat to grasses, trees, flowers and ornamentals because there is little root absorption. The risk of drift damage is reduced, as well. Biodegradeable, trouble-free and gentle, Trimec is precisely formulated to eliminate the hazard of on-site mixing errors. Only Trimec has all these advantages:

- Controls the widest range of broadleaf weeds
- Gets hard-to-kill species with one treatment
- Wide safety margin for lawn grasses, ornamentals
- Minimum hazard from root absorption
- No vapor action after application
- Effective weed control in wide temperature range
- Unique formula overcomes water hardness problems
- Treated areas may be reseeded within two weeks
- Non-flammable and non-corrosive in use
- Product stable several years above 32° F.
- Biodegradeable: friendly to the environment

Sorting out the values

If you've been making unreasonable sacrifices of personal time and family interests to meet the demands of your work, Trimec is one way to give yourself a break.

See your local authorized Gordon Distributor. He stocks many superior turf products, including Trimec and Trimec Bentgrass formula, and can share some helpful experience in dandelion control. Give him a call today.

Trimec® is a registered trademark of PBI/GORDON Corporation. U.S. patent No. 3,284,186.

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PROSCAPE

By Michael Hurdzan, Ph.D., golf course designer and consultant

Q: *What is buffer pH?*

A: Buffer pH is a measure of the slowly changing chemical properties of soil particles, not the soil solution. Soil pH is usually measured by mixing a small amount of air dry soil with an equal amount of water and using a calibrated electrode probe to measure the hydrogen concentration of the soil. Since this measurement is of the soil water, it may vary greatly depending upon any soil amendment that had been added. For instance, if the soil was recently limed, one would expect the pH to be higher than that of the soil particle.

Since the soil solution pH is so variable, many soil test labs include a measure of buffer pH, which is a measure of the acidity or alkalinity of the soil particles and not the soil solution.

However, remember that it is the soil solution that most influences nutrient uptake and hence plant growth. Manage the soil water and you manage the plant growth.

Q: *What causes chlorosis?*

A: As most are aware, chlorosis is a term applied to abnormal yellow color of plant parts caused by poor chlorophyll production. The yellowish symptom is most often caused by a nutrient deficiency, but it also can be caused by insect or disease injury, improper air-water conditions in the root zone, or other chemical or physical injury.

From a nutrient standpoint, the chlorophyll molecule is complex and many elements are needed to construct it. Carbon, hydrogen, nitrogen, oxygen, and magnesium make up chlorophyll and a shortage of any of these elements, especially nitrogen and magnesium, restricts its production. In addition, many intermediate steps in chlorophyll production depend upon adequate amounts of iron, sulfur, manganese, copper, zinc, and other elements. However, most often lacking are nitrogen and iron since they are relatively mobile and easily lost.

Reoccurrence of chlorosis can be minimized by frequent application of elemental nitrogen and iron, or a less frequent application of slow-release nitrogen and chelated iron. Chelated iron is iron combined with an organic carrier which breaks doen slowly in the soil. A sensible fertilization program including micronutrients should prevent chlorosis. **WTT**

Chlorophyll Molecule