AMERICAN SOD PRODUCERS ASSOCIATION

1982

MIDWINTER CONFERENCE PROCEEDINGS

MARCH 3-5, 1982

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TABLE OF CONTENTS

"STATISTICS!!
BUT WHAT DO THEY MEAN?"

By Dennis Marx, Ernst & Whinney, Omaha, NE

Because of today's high interest rates and a weak economy, effective business management has become a necessity for business continuity. This involves generating important, timely financial data for the business, being able to analyze and understand the information, and taking management actions which will improve weak or inefficient areas.

In this regard, ASPA engaged Ernst & Whinney to conduct a sod industry financial statistics survey. This report summarizes the results of Ernst & Whinney's survey of North American sod producers for the years 1979 and 1980. These results can be used for comparison to your own operation. The report also describes how a break-even analysis can be used and how a simple calculation can demonstrate the incredible cost of outstanding accounts receivable.

If a sod producer is to analyze financial data, he must look beyond just the numbers on the page. He must be able to analyze the meanings of percentages and ratios. By comparing these percentages to industry averages he can identify strengths and weaknesses.

To effectively use percentages and ratios, one must know how to compute them as well as how to interpret them. On an income statement, we generally compare various expenses to sales because many times they will have a direct relationship. For example, if we want to know what our labor cost percentage is, we would divide total labor expense by sales. In order to evaluate our relationship between labor costs and sales, we have to compare it to a standard

such as an average for the industry or to our own business's average for prior years. If the computed percentage is relatively too high, our productivity is poor and action should be taken to improve it.

Following are the results of the income statements survey:

COMPOSITE SUMMARY OF
INCOME STATEMENT PERCENTAGES

	Industry Average	Yours
SALES		
Sod production sales	86.93%	%
Sod installation sales	4.33	
Other sales	8.74	
	100.00%	
COST OF SALES		
Beginning inventory	11.83%	
Material purchases	19.98	
Labor and salaries	22.72	
Other costs	23.87	
Less: ending inventory	(13.75)	
	64.65%	
GROSS PROFIT	35.35%	
General and Administrative (expenses)	(21.28)	
Net other income (expenses)	(3.09)	
NET INCOME (LOSS)	10.98%	

As you well know, most producers do not inventory their growing stock. The above inventory percentages include the costs of seed, fertilizer and chemicals. In addition, a sod inventory valuation method sometimes used is to record the inventory's estimated sales price less cost to market. This gives the banker a better idea of the value of the business.

While percentages are used to evaluate the income statement, the balance sheet is evaluated in terms of both ratios and percentages. Some of the more important

balance sheet statistics are described below, as well as the averages for the sod industry which were obtained from the Ernst & Whinney survey.

COMPOSITE SUMMARY OF BALANCE SHEET RATIOS

	Industry Average	Yours
Current Assets to Current Liabilities	3.58 to 1	__ to 1
Total Liabilities to Equity	2.63 to 1	__ to 1
Inventory to Working Captial	unknown	%
Sales to Equity	4.18 to 1	__ to 1
Net Income to Equity	35.6%	%
Sales to Inventory	unknown	__ to 1
Sales to Accounts Receivable	unknown	__ to 1
Sales to Total Assets	1.2 to 1	__ to 1

Current Assets to Current Liabilities:

Commonly referred to as the "current ratio", it is obtained by simple division. This ratio measures the liquid assets--cash, receivables, inventories, short-term investments--available to meet debts falling due within one year. It is considered to be a test of solvency. A current ratio of less than 2 to 1 is generally thought of as a possible symptom of financial stress. The results of the Ernst & Whinney Survey reflect an average current ratio of 3.58 to 1.

Total Liabilities to Equity:

This ratio shows the ownership the producer has in his assets. This ratio measures the amount the business is capitalized and indicates the extent to which the owner, or the creditors, is benefiting from the earnings on the assets. The Ernst & Whinney survey revealed a ratio of 2.63 to 1.

Inventory to Working Capital:

Derived by dividing inventory by the difference between current assets and current liabilities, this percentage is a measure of inventory balance. This calculation results in the share of working capital represented by inventory. As a general rule, when this percentage exceeds 80%, a business is showing signs of inventory imbalance. However, the level of this ratio may vary between industries. Because most sod producers responding to our survey do not inventory, we were not able to derive a meaningful ratio.

Sales to Equity:

This ratio, often referred to as the equity turnover ratio, is one indicator of how well invested capital is being put to work. It can also aid in measuring the profitability of an investment. Both extremes of this ratio, high (overwork) and low (underwork), are considered unhealthy. The former could reflect overuse of credit and the latter could suggest overcapitalization. An average ratio of 4.18 to 1 was computed for the sod industry.

Net Income to Equity:

This percentage shows a producer's return on the amount he has invested in the business. The percentage can be used to compare this investment to alternative uses of investment capital. The sod industry's average was 35.6%.

Sales to Inventory:

Sometimes referred to as the "stock to sales" ratio, this is another measure of the relative size of inventory. This ratio presents a hypo-

thetical inventory turnover figure. If inventories were being maintained on a LIFO costing basis, this ratio would tend to increase during inflationary periods. Too low a ratio could indicate excessive inventory, which could in turn suggest a problem with obsolescence. Again, because very few producers responding to the survey recorded inventory, we could not determine a meaningful ratio.

Sales to Accounts Receivable:

This ratio is one measure of the collectibility of receivables. In general, a higher ratio (net sales divided by accounts receivable) would reflect a more rapid collection of receivables, when taken in conjunction with the normal terms of sales. A ratio of 12 times, for example, would indicate receivables being "turned over" monthly. Since a number of producers did not indicate their accounts receivable, we could not develop an average ratio.

Sales to Total Assets:

Commonly referred to as the "asset turnover" ratio, this ratio is used to help indicate how efficiently a company utilizes its assets. Generally, a high turnover ratio indicates a company is effectively using its assets to generate sales; a low ratio suggests underutilization. This turnover ratio, however, does place an advantage on the use of old assets because of their relatively low book value. Therefore, other ratios should also be considered when evaluating the performance of a company in this area. The industry average was computed to be 1.2 to 1.

Break Even Analysis:

Profit is dependent on three basic factors: the product's selling price; costs of production and distribution; and the volume of sales. Break even analysis uses these factors to help the business manager determine the right price for the product to insure a profit or the volume of sales necessary to break even.

Certain concepts need to be understood to apply the analysis. The first is understanding the differences between fixed and variable costs. Fixed costs do not vary with production. They would include such items as mortgage and equipment lease payments. On the other hand, variable costs fluctuate directly with sales such as chemicals cost and production labor.

The first step in break even analysis is to categorize your costs. Fixed costs for one year would be stated as a total dollar amount which should not change significantly regardless of the sales volume. Variable costs should be stated as a per unit cost. This can be obtained by dividing the total variable costs for a total production period, which would be from soil preparation through harvest, by the number of units produced; i.e. rolls of sod. This gives us the cost of producing one roll of sod. If you compare this to the selling price for that roll of sod, you can determine the amount of profit per roll of sod or the variable profit. By dividing the variable profit into your total fixed costs, you have determined the amount of sod you must produce in a year to break even.

For example, assume a sod producer has fixed costs of $100,000, variable costs of $1.25 per roll, and sells his sod for $1.75 per roll. Our variable profit

per roll is $.50 ($1.75 - $1.25). This gives us a breakeven point of 200,000 rolls of sod calculated by dividing the fixed costs of $100,000 by the $.50 variable profit per roll. This same analysis can also be used to develop a target selling price which is necessary to get a desired profit.

Costs of Accounts Receivables and Inventory:

What does it cost to have an old outstanding receivable or slow moving inventory items sitting on the shelves? Any producer who has borrowed money recently knows the interest rates. Assume a producer sells $40,000 worth of goods on credit per month with an average collection period of 60 days on accounts receivables. This gives him an average receivable balance of $80,000 or two month's receivables. If that same producer has outstanding loans at a bank with the prime rate at 20%, those outstanding receivables are costing him $16,000 a year ($80,000 x 20%). If that same producer can speed up his collection period to 30 days, he has cut his average receivables in half and saved $8,000. To make the same amount of money by increasing sales, the average producer would have to increase sales by $72,860. This was obtained by dividing the $8,000 savings by the average net income percentage of 10.98% obtained from the Ernst & Whinney survey.

Using percentages and ratios can greatly improve the performance of any business, however, they are no better than the financial data on which they are based. Therefore, it is important to look at the accuracy of the financial data being generated as well as if it is providing the manager with the things he needs to know. Good financial data is fundamental to the management of any business and Ernst & Whinney encourages producers to use their CPA to provide them with guidance in the use of generally accepted accounting principles and the interpretation of statistics.

COSTS OF CREDIT & HOW TO CONTROL THEM

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Interest rates are at historically high levels with credit costs becoming an increasingly major portion of any business' expenses. Controlling those costs requires constant attention and choosing your lending source is probably the most important part of such controls.

Establishing a close relationship with your banker is highly important if you want to cut your costs in credit borrowing. There are many sources of credit. A good banker will see that his customer gets the best package to suit his requirements. Also, he can help you with your deposit funds and other services.

I'll talk about how you can develop banking relationships to your advantage. What your banker looks for in you and what you should expect from him.

First you must locate a good banker. The kind of person you want is aggressive and business development oriented, someone who develops a lot of contacts, is forward looking, flexible, competitive, innovative and sincerely interested in your business. He will want to build the community through sound, productive investments. Also he should be big enough to take care of your credit needs or to properly arrange for them. It's not always easy to find this kind of person, but believe me, it's well worth the effort. A good banker knows how to move money around and this is what you want to get accomplished. Once you've found him, though be sure to respect his time.

You will also want a banker knowledgeable enough to locally control your credit needs. If he needs a participant due to the size of your credits, I strongly urge that you go through him to get acquainted with the participant bank. If you are able to get these bankers to visit your place of business, this will enhance the trust and confidence factor between a customer and his banker. The better you know each other, the better will be your relationship. Another good practice is get to know your banker's boss and maybe another loan officer. That way there will be more depth in your relationship.

A banker who extends credit is interested in the five C's of credit - character which is by far the most important, capital which means having sufficient wherewithal to have staying power, capacity which refers to ability to repay, collateral or security for the loan and conditions of the national and local economy. The banker is very interested in your ability to pay through the customers generating sufficient cash because he does not want to own collateral assets as a source of loan repayment.

Remember also that banking is a two-way street. The banker expects the customer to give all or substantially all of his deposit business to the bank. A banker must have deposits if he is to extend loans and it is only fair that there be reciprocal business. Customers sometimes feel it's smart to put all their deposits in a brokerage house money market fund so that the money can be shipped out of the local community and into a big city like New York. Then, when they need credit, they rush to their local bank. At Bank of Hawaii we usually suggest that these people go back to the brokerage house and see what kind of credit they can get. Of course, it's usually not much. That brings home to them the fact that it just isn't smart to play this game. It may be attractive in the short run, but when the going is tough, having a good banking relationship is of extreme importance. This can only be built up over time. The businessman who gets what he wants at his bank has spent a lot of time building his reputation as a reliable person.

Your banker will want to see that you are organized, that you know your business, do financial planning and are capable of managing any future expansion. I strongly urge you to find a competent CPA to do your accounting and tax planning - a competent attorney to assist you with legal matters such as converting from a proprietorship to a corporation to take advantage of various tax considerations, retirement and pension plans, as well as some limiting of personal liability in the conduct of your business.

It's very important that businessmen prepare forecasts and plot where they want to be one year from now, two or three years from now. Additionally, actual results should be compared periodically with the forecasts, perhaps every month or three months. All of this implies the necessity of maintaining a good set of books. It's extremely important for any businessman to keep track of where he's been and where he's going. You can only do this by paying attention to your books. In my opinion it is pennywise and pound foolish to rely on inadequate accounting assistance in today's complicated world.

Your banker will ask you a number of questions about your statements such as an aging of your accounts receivable and accounts payable, the quality of inventory, what is invested in fixed assets, terms of loans outstanding. He does this for two reasons: 1) He wants to understand your figures and 2) He wants to know if you understand them. Good records and good knowledge of your business are impressive and will help your banking relationship.

In my opinion, with the economy and business conditions changing so rapidly, it is imperative that we all learn to work intelligently and not just work hard. Being a successful sod grower requires a high degree of business expertise and smart money management. This means being knowledgeable of current events and financial trends. We should read such magazines as Business Week, U. S. News, Time, Newsweek, Wall Street Journal and trade magazines for our own business. You probably say to yourself that you don't have time for all that reading. You get up with the sun and go to bed late at night. However, thanks to modern technology there is a way that you can get a lot of this information by listening to tapes as you drive in your pickup truck. I am including a list of sources of taped and newsletter information which you

can subscribe to for a relatively modest cost. It's very important that we all be well informed about what's going on so that we can use this information in making our business decisions. You should expect continued volatile business conditions. You must keep up-to-date to survive.

A good banker will help you with your credit needs by being knowledgeable about sources of credit other than just bank loans. I am referring to such things as Production Credit Association, State Farm Loan Programs, Federal Land Bank and the Farmers Home Administration and Small Business Administration. These are among the more popular areas where farm credit can be obtained. A good banker will also be knowledgeable about the Farm Credit System. Other sources include insurance companies, farm supply dealers credit,and equipment leasing programs. Lawrence Warehouse System has a plan under which you can offer the bank your growing inventory as collateral. A proper packaging of a farm's financial needs is very important. Fixed assets should be funded with long term financing, if possible, at fixed rates or from owner's capital. Don't get into the habit of borrowing short term for long term purposes. It won't do you any good financially and bankers don't like to see frozen short term credit. That type of credit should be tied into your normal cycle of growing, selling, and turning your product into cash. Get in the habit of paying off your short term borrowings on or before maturity. If you are unable to do so, let your banker know about it ahead of time. Don't wait for him to call you. Don't surprise him because he may not be able to help you without advance notice.

As to using your deposits to your advantage, your banker can help you with that too. You'll need a checking account and if you are an unincorporated sole proprietor, for example, you can probably get some interest on your checking account. You'll probably want a savings account where idle funds are left to accumulate and, if you can accumulate enough, look into buying longer term certificates to get a higher return. At a later date, you can use these as collateral to get a loan from your bank at 1% - 2% more in interest than you are paid. Your banker likes to see some accumulation of deposits with him. As I mentioned, this is a two-way street and banks today are vastly more interested in deposits than they are in loans although a good bank does not stop making sound loans in the local economy because they know that that it is very important to keep money circulating.

Another thing to keep in mind is the element of float in a deposit relationship. If you deposit a check in your local bank that's drawn on a distant bank, it's going to take your bank perhaps two or more days to collect the money - even though you are given immediate credit in your account. I would not advise playing it too close with your banker by consistently getting him to pay interest on float. He is unable to invest that money and you are in effect getting something for nothing. Your banker can show you how to cut down on float time by arranging for your receivables to wire funds to you, especially if it's a large amount. Your customers may be willing to do that if their relationship with you dictates that you be paid a little bit faster.

Another way your banker can help you is to set up a new relationship with a purchaser of your product. If that purchaser is not known to you, your banker can help you check him out. He may also be able to set up a relationship whereby the purchaser opens a letter of credit in your favor. This lets you know you're going to get paid, assuming you deliver the goods according to the agreement. All of these things can save you time, money, and worries about collectibility.

Here are a few other areas that your banker undoubtedly can help you with. He can help you with credit analysis and counselling of your own business as well as that of some of your major customers. He will suggest leasing alternatives for the purchase of equipment versus borrowing. The bank may also very likely have record keeping or payroll accounting services, accounts receivable and accounts payable programs to help you with your paperwork. If he is active in farm lending, he will even know about farm management. Estate planning is important for farmers and often your banker can give you ideas in that regard. Electronic banking is becoming a reality. Within three or so years you will be able to use a personal computer to accomplish much of your banking. Ask about it.

Just as your primary purpose for being in business is to make a profit, the banker is in business to make a profit. It's very important these days because growth depends on increases in capital and the major source of that will be retained earnings. In your shopping for a banker, don't pick one who necessarily has the lowest rate because he may not be the best banker. Talk to him about his business. If he indicates that he's going to continue to do business as usual, I would stay away from him because he probably won't be in business very long. You want an innovative, creative, forward thinking person. Also, in your business I'm not sure if you give price concessions to customers, but if you do, I assume it's for good reason. Remember that the banking business is just like any other. You may not necessarily get the best price right off the bat, it's a question of building a relationship that's meaningful on both sides and profitable to both sides. What I'm saying is, your banker is entitled to a fair return for his services. This could be a combination of loan interest, fees for services, and credit for deposit balances, but in any case you've got to have a decent understanding of what he expects. Look not only to your own interest but to your banker's as well. Likewise, the relationship has got to be profitable for you. His help should assist you in making a profit. The banker wants you to do well because the health of his customers is good for both the community and the bank.

I want to talk a little about managing your business. Nowadays it's much more complicated to run a business and getting more so - government regulations, the uncertain economic climate, continued high inflation, difficulty in finding good people and so forth. Times will probably continue to be volatile and challenging for years. There is a great deal of pressure on all business people and managing is crucial. One thing to concentrate on is how you use your time. You don't have any to waste. I know all of you are aware of this and you should concentrate your efforts on working smarter, more efficiently, and planning ahead for changes. It's important to have a game plan thought out in advance. None of us can operate out of our back

pockets with an old envelope and a pencil any more. Show the banker your plans and ask for his advice. The farmer should choose a banker whom he believes is tuned to the '80's. Likewise, the banker is going to be looking for this in the farmer.

I would urge also you to spend more time developing relationships within your own business circles as well as the business circles of your community, such as your Chamber of Commerce. You'll be surprised at how much you can learn. Attending conventions like this is an excellent way to obtain new information. There are any number of similar meetings throughout our country and I am sure you can identify those which will be of assistance to you. I urge you to do as much as you can in this regard. Times are changing fast and you can't keep on top of it by operating in the same old ways. Your banker can help you find out what's available in seminars at home or perhaps somewhat further afield. You should keep your mind active and working. It will help you make better decisions and improve your business.

My discussions so far has not been too specific about the cost of borrowing money. Interest and fees charged on loans are based on several factors. You should know how a banker approaches pricing his inventory, which is money.

Here are the basic considerations:

1) The amount borrowed. The work involved to put together a loan is about the same regardless of loan amount so larger loans may be priced lower than small loans.

2) Term of the loan. Generally, a longer term loan will be priced higher than a short-term loan. There is more risk involved for a long-term loan.

3) The bankers perception of the risk involved in granting the loan to a specific borrower will affect the rate charged. The more the risk the higher the rate.

4) Collateral offered. Good, liquid collateral such as stocks should allow for a rate reduction off an unsecured loan rate.

5) Overall banking relationship with the borrower is very important. Does he keep good deposit balances? The banker likes demand deposits, savings passbook deposits, savings certificate deposits and finally jumbo CD's (over $100,000) in that order. These range from low cost to higher cost funds. In establishing and maintaining a good banking relationship, taking care of your banker deposit wise is very important and could save you money in the long run. He will be much more receptive to doing things for you, if you have an excellent deposit relationship. You are more likely to get better loan rates and faster service.

6) How much time and effort the banker has to spend servicing you may have an effect on the rate charged.

Ask your banker how he approaches pricing your loans. What considerations he feels are important. You may be able to help him assist you for instance by offering collateral in exchange for a lower rate or maybe an increase in deposit balances for a lower rate. In these times of volatile cost of funds you will probably experience more and more rates quoted on a floating basis. The base or prime rate plus X% to move up and down as that rate changes. This is fair to both borrower and bank. Some of you may experience more esoteric methods of loan pricing such as 110% of base rate with a good compensating balances. This method is more likely to be used in connection with larger lines of credit. Whatever method is used estimate what the dollar cost will be to you. Ask your banker to quote you more than one way of pricing the loan so you can choose what's best for you. Over the next 2 - 3 years a fixed rate will probably be better for you, but you probably won't get it.

One thing you should expect of your banker is a prompt response once he has all the information he needs. Occasionally, he may wish to ask some more questions once he has digested the facts surrounding your application. Don't worry if he asks more questions as it should be for the purpose of doing a better job for you and you will probably get a better deal. If you are candid and prompt with him, you have a right to expect the same. If he asks for a few days to reply, give it to him. Remember he has plenty of work to do. Also, don't waste time comparing your loan rate with your friend's rate - no two loan deals are the same and it's like comparing sod to pineapples.

A good relationship with your local banker can be one of your prime assets. Take time to cultivate the relationship. A good banker will respond favorably because he knows that if you do well, with his help, he will do well also.

Thank you very much.

SOURCES OF INFO

TAPES	
Sound of the Economy	Citibank 399 Park Avenue New York City 10043
Various tapes on investment, management and selling	Nightingale - Conant Corp 3730 West Devon Avenue Chicago, Illinois 60659 Phone 800-228-5454
The Complete Entrepreneurial Managers Library	Center for Entrepreneurial Management, Inc. 311 Main St. Worcester, Mass. 01608 Phone 617-755-0770
Newstrack	The Talking Magazine P. O. Box 224 Englewood, Colorado 80151
Executive Seminars	Nation's Business 1615 H Street NW Washington D.C. 20062
Investment & Economic Advice	Wellington Financial Services Honolulu, Hawaii
PERIODICALS	
Time, Newsweek, U. S. News & World Report, Wall Street Journal	All readily available.
Agri Finance	Century Communications Suite 5520 Touchy Avenue Skokie, Illinois 60077
Farm Money Management	Box 67 Minneapolis 55440
Agricultural Letters	Federal Reserve Bank Box 834 Chicago 60690

TURF IN HAWAII

By Dan Shigeta
University of Hawaii-Extension

Commercial sod production in Hawaii is insignificant as an agricultural industry with only one sod farm located in Pearl City operated by Mr. Shigemura. Landscape contractors obtain vegetative propagation materials, mostly verticuts, from the sod farm, golf courses, and homeowners, where hybrid Bermudas, St. Augustine or Zoysia is used.

Nine-five percent of turf grown in Hawaii are Bermuda grasses. The common Bermuda are seeded for golf course fairways, parks, hotels and condominiums. Sprigs, of course are used for planting the hybrid Bermudas on golf course greens and some homes. Tifdwarf, Tifgreen and sun turf are popular. Other grasses grown in Hawaii are the zoysias, St. Augustine, Centipede and Hilo grass (paspalum dactylon -- considered weeds in Bermuda lawns). Hilo grass is the predominant turf in the Hilo area on the island of Hawaii and other heavy rainfall areas in the State. Paspalum vaginatum swartz, called seashore paspalum, is a very salt tolerant grass and is grown in highly saline soils, on beach frontages and sections of golf course fairways exposed to ocean spray and/or high salt water table. Kikuyu, introduced from tropical Africa as a pasture grass is being used by some as a lawn grass on Maui and is being tested as a golf fairway turf.

At the higher elevation locations on Maui where the termperature drops at times to cause frost formation, Bermudas are not at its happiest. Twelve perrenial ryegrasses and 8 cultivars of Kentucky bluegrass were grown for adaptability trials. BA 62-54 now named Victa showed least infection from rust. When fertilized at high rates, good, green growth were obtained but mowing was required twice a week.

New grasses are difficult to be introduced into Hawaii due to stringent quarantine laws. The grasses are kept in a quarantine greenhouse for 1 year and the importer must pay all of the costs for the period. In addition, I understand that the light transmission for the greenhouse has been extremely poor for good growth.

Diseases of turf is not a problem in Hawaii. Basically, Bermudas are very tolerant to diseases. The fairly uniform climate reduces or do not place the grass under stress conditions. Occasionally, diseases do occur and are in the following order of frequency: Helminthosporium, Pythium cottony blight and rhizoctonia brown patch.

Insects do cause some damage to Hawaiian turf. The armyworm occasionally causes unsightly brown areas in turf. The grass webworm (smaller adult and larvae) are more frequent troublemakers. Diazinon applications easily overcomes this problem. The Rhodes grass scale are often a problem on the hybrid Bermudas and rarely on the common.

Weeds are the major problem in turf production. The more prevalent problems are the crabgrass, goosegrass, spurges, Hilo grass, kyllinga and the purple nutsedge. MSMA with repeated applications have provided satisfactory results for the above weeds except spurges where dicambra is recommended.

Slides were shown to illustrate the above discussion.

Slides were also shown to illustrate some exotic protea blossoms as well as gingers, heliconias and the scenic Hana coast.

"BONUS, PROFIT SHARING & INCENTIVES PLANS"

by Dennis Marx, Ernst & Whinney, Omaha, Nebraska

Employee benefit plans serve a variety of purposes. They provide a form of employee compensation which is not taxable until some future date. They can be used as incentives to affect employee current performance. And they can provide employees with a means of building their personal estates. This article presents a broad overview of a number of different types of compensation plans.

The "hottest" new compensation plan was recently created by the Economic Recovery Tax Act of 1981. It is called an "incentive stock option." Under this type of plan an employee may be granted an option to purchase, at any time during the option period, his employer's stock. The option price, or the price at which the stock may be purchased, must be equal to 100% of the stock's "fair market value" at the date the option is granted. The employee may then exercise the option at any time during the option period and is not required to pay any tax on the gain until the stock is sold.

This "incentive stock option" therefore allows an employee to buy his employer's stock at a price lower than its actual value at the time the option is exercised. This of course assumes the value of the stock goes up, rather than down during the option period. It can be used as an incentive for key employees by offering them a financial interest in the business at potentially a bargain price. Also, it is an incentive for employees to improve performance which should increase profits and the value of the stock.

An employee will be taxed at the favorable long-term capital gain tax rate if:

1. He holds the stock for at least two years after the date of option grant and at least one year after the stock option is exercised.

2. He must be an employee at all times from the date of option grant to three months before the date of exercise.

If the employee fails to meet the holding period requirements, he will be taxed at ordinary income tax rates on the lesser of 1) the gain realized or 2) the difference between the option price and the stock value as of the exercise date.

If the employee fails to meet the employment period requirement, he will be taxed at ordinary income tax rates at the time of exercise.

To qualify as an incentive stock option, certain specific requirements must be met:

1. The plan must be approved by shareholders within 12 months of its adoption, and the option must be granted within 10 years of the plan's adoption or the date the plan was approved by shareholders, whichever is earlier.

2. The plan must specify the total number of shares on which options can be granted, and, must specify the employees (or class of employees) who are eligible for options.

3. In the case of options granted after 1980, the plan must limit the total fair market value of stock for which an employee may be granted options in

any calendar year to $100,000 plus any "unused limit carryover" from the 3 prior years. An unused limit carryover is one-half the excess of $100,000 over the fair market value of stock for which options were granted during the calendar year. Therefore, assuming that no incentive options are granted to an employee in any calendar year before the actual date of grant, the maximum amount that an employee may be granted in any one year will be:

Year	Maximum Amount
1981	$100,000
1982	150,000
1983	200,000
1984 and after	250,000

4. The option cannot have a term exceeding 10 years and it must be granted at a price of at least 100% of fair market value (or a price determined in a good faith attempt to be at least 100% of fair market value) on the date of grant.

5. The option must be exercisable only by the employee during his lifetime and not transferable except at death.

6. The option cannot be exercisable while a previously granted incentive stock option (regardless of price) is outstanding. To avoid circumvention of this straight sequential exercise rule, an incentive stock option is treated as outstanding until the option is exercised in full or expires by the lapse of time.

7. An option cannot be granted to an individual who owns more than 10% of the voting power of the employer, a parent, or a subsidiary, unless the term

of the option is not more than 5 years and the option price is at least 110% of the stock's fair market value at the date of the grant.

Effective Date. The new rules generally apply to options exercised after 1980 if the option was granted after 1975. For options granted after 1975 and before 1981, the new rules will apply only if the employer so elects. In addition, the election can be effective only with respect to the grant in any one calendar year of options on stock worth $50,000 (measured by the value at date of grant), and an aggregate of $200,000 for all pre-1981 years.

For options outstanding on August 13, 1981 which do not meet the new rules, employers have until August 13, 1982 to make conforming amendments and to secure shareholder approval, if necessary, so as to qualify such options for the new treatment. Such amendments will not be treated as the grant of a new option.

Unfunded nonqualified deferred compensation plans can be used as current incentive and also to provide additional income at retirement. The fundamentals of an unfunded deferred compensation plan are that the:

- The compensation is deferred to a specified future date;
- No tax is payable on such compensation until it is actually or constructively received.

There are certain requirements which must be met in order to defer tax on the compensation. A definite written deferral arrangement should be formed before the income is earned with no payments made before the date or event specified in the agreement. In addition, no funds should be escrowed or placed in trust for the benefit of a particular employee to fund the deferred compensation.

Such a plan allows the employer to increase an employee's compensation without a current cash outlay. This can be beneficial to a high tax bracket employee if he can defer receipt of the compensation until retirement at which point he would probably be in a lower tax bracket.

A "Phantom" stock plan is another popular unfunded deferred compensation plan. Under this type of plan, bonuses, expressed in terms of stock, are credited to an employee's account. These bonuses are made payable at a later date. The stock is not in existence at any time up until distribution. The distribution may be paid in cash or in stock, and only then does the compensation becomes taxable.

The benefits of the "phantom" stock plan are a deferral of tax on the compensation, and an incentive to the employee since the value of the bonus depends upon the value of the company's stock. In theory, the better the employee's performance, the higher the profits and the value of stock.

As you can see, there is a variety of different types of employee benefit plans. In addition, to achieve the desired tax results, employee benefit plans must meet various technical requirements of the tax law. In all cases, an employer should acquire professional help in choosing and designing a employee benefit plan.

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WHAT IS COMING IN COOL SEASON TURFGRASSES?

By Doyle Jacklin: Marketing Manager,
Jacklin Seed Company, Post Falls, Idaho

This perspective is somewhat different from what you've been exposed to in the past and I hope it will serve to create new ideas in relation to the use of cool season grasses, whether they are seeded or sodded.

Cool season grasses--our present varieties are so beautiful, why in the world would we want anything different? Sod growers know how to grow the cool season grasses (mainly Kentucky Bluegrass blends) so why change? Seed merchants and sod growers both know how to seed or sod cool season grasses,--do we really need new ones to make things more difficult? Obviously the answer has to be yes-- whether because of disease susceptibility, seed production problems, or specific environmental stress situations, there must always be change in the development of new cool season grasses. Let's digress a minute and consider just what are the universal uses for grass.

Rill Erosion can start from the effects of a gentle rain on exposed slopes. Gullies form, cutting deeper and deeper. Cool season grass species adapted to wetter and lower ph conditions are solving the soil erosion problem. Wind removes valuable top soil and destroys plants by depositing soil on growing plants. New cool season grasses adapted to dry conditions are helping to reclaim wind blown areas. Forest fires destroy and expose previously covered and protected soil to the ravages of wind and water erosion. Man creates the same destruction as fire when he overharvests the timber stands. Grass, once again, stabilizes erosion. Often sod is used in draws and on hilltops. Road Transportation causes a great deal of erosion. New cool grass varieties--better adapted to poor roadside soil conditions, able to withstand dry stress periods, and more tolerant to wintertime salt applications, are available. Sod growers are going to have to learn how to grow a new generation of grasses specifically for roadside stabilization. Devasted soils, caused by mining, can be reclaimed through the use of special grasses, which will tolerate widely varying ph levels, mineral content, and moisture holding capacity.

Now that we've seen some of the differnt uses for cool season grasses, let's take a closer look at some of the specific varieties and even evaluate whether they can be grown by sod growers. Arizona fescue, obviously a native grass and unique to the fine fescue category, is characterized by its bunchy growth habit! It is a non-aggressive, slow growing variety. This means if it's going to be grown for sod, it must be combined with a non-aggressive sod forming Bluegrass variety in order to develop a liftable sod. The use of netting may be advisable when producing sod in the warmer, dry areas of the Southeast where there may be a demand for this grass. Covar Hard fescue was selected from an arid region of the Pacific Northwest and is a very short, slow growing, bunch-type fescue which can be an ideal ingredient in sod for lawns in water-short areas such as Aurora, Colorado, and other parts of the West. In mixtures, covar will have to be the primary ingredient by weight and percentage, with other sod forming Bluegrasses or turf-type perennial ryegrass included for better liftability. Lemmons Alkali grass is excellent for areas that sound just like its name--alkaline soils. This means for dry potholes, and higher ph soils in the dry midwest, or the West. Because it is not as aggressive as most Bluegrasses, it will have to be a major ingredient in any mixture grown for sod, and netting will be necessary for good liftability.

Goshen Prairie Sandreed can produce seed, however, it can better be grown as a sod which then must be lifted and cut into plugs for planting on sand

dunes, dry sandy desert, or other similar soils. One of the more manageable methods of handling may be to cut the sod strips into smaller squares, transplant these squares into plastic trays for transportation to the planting site, and planting from the trays. Alkali Scanton is also a selection for possible use on alkaline or calcified soils. It can be included in mixtures planted for sod production, but must be included with a non-aggressive sod forming grass such as a more open, slower growing, Kentucky Bluegrass, or slower growing turf-type perennial Ryegrass.

Tundra Bluegrass is a very unusual plant. It is very, very short, extremely slow growing, and adapted to higher elevations while able to withstand extremely cold temperatures and low rainfall. The area for its possible use may be limited. However, it is something that may have great value from a genetic standpoint, in breeding new varieties of Kentucky Bluegrass incorporating the low and slow growth characteristics while providing adaptability at lower elevations.

Red Top is a perennial sod forming grass which grows extremely well on moist, acid soils. It has been around for many years and was originally used as a primary grass for home lawn and turf purposes. It has good value, not only as a turf grass mixture component, but for use as a forage grass on high acid soils and revegetation of acid coal soils. The newly certified variety, by the name of Streaker, has just received registration from the crop and soil science society, and will be an ideal candidate for inclusion in seed mixtures grown for sod production intended for use in wet, bottomland areas.

Reuben's Canada Bluegrass is a perennial non-aggressive sod-former ideally suited for minimum moisture requirements of 35cm. It is an excellent species for poor disturbed and derelict soils where it will withstand low fertility and somewhat acid soils This variety was patented as a new invention, and will be a much sought after grass for reclamation and environmental use. Reuben's, because of its non-aggressive growth habit, and somewhat open turf, can be used with some of the other non-aggressive grasses mentioned earlier such as Alkali Scanton, Goshen Prairie Sandreed, and the bunchy-type hard fescues. But, homeowners and sod growers will have to accept the fact that the type of sod produced from such mixtures is not going to look like our present Kentucky Bluegrass sods. The color is going to be lighter, the density is going to be thinner, and the growth will be somewhat more stemmy; however, the sod will be able to withstand less maintenance. In general, you give up something in one area to gain in another. Meadow Foxtail has good promise for use as a cool season grass adapted to wetlands and for shoreline erosion control. New varieties are being developed which are very cold tolerant, and may be candidates for inclusion in certain sod seed mixtures. It is, however, a very coarse leaved grass and management practices if grown for sod will have to be developed. Tioga Deer Tongue is from the Northeastern area of New York/New Jersey. Deer Tongue is a very adaptable grass for extremely poor soils and is quite palatable to deer and other wild game. It is characterized by its open growth, broad leaves, and exposed crown. Seed production problems have apparently been solved and this variety is being used extensively on coal mine spoils. It is quite possible that Deer Tongue can be produced by sod growers for use in revegetating native mine spoils which have to be sodded, rather than seeded, in order to provide immediate protection from erosion.

These varietal developments summarized here are only a few of the many cool season grass varieties being researched for a wide number of uses. The full text of my comments are in the May/June issue of the ASPA Turf News magazine.

Survival of the Fittest

Dale Kern, President, Seed Technology
Marysville, Ohio

Our planet earth is one gigantic battlefield with every living organism competing for survival. There is constant competition between members of the different families, genera and species and even members of the same species or varieties.

I would like to explore briefly three major areas of survival. First; a few of the unique characteristics which make certain crop and weeds undesirable and help them to survive in your turf. Second; I would like to suggest some steps you can take to prevent the undesirables being introduced into your fields. Third; to share with you the results of our latest research and how it can be utilized by a computer to help you select the cleanest, highest quality, and fastest growing turf seed at the lowest possible cost.

Perennial dicots such as dock, plantain, buckhorn, dandelion and chicory all have unsightly broad leaves with deep tap roots 3 or more feet long which can be the source of new plants for years to come, even after the original plant is removed with the sod. Black medic, purslane and oxalis are capable of prostrate growth forming areas of off type and color. Chickweed, clover and ground ivy spread by rooting at the nodes suffocating the desirable grasses. Most of these undesirable contaminants can be controlled with a selective herbicide. Additional expense is entailed.

Many of the most undesirable contaminants are monocots(grass). Most of which have coarse broad leaves forming a clump or bunch in your sod and are difficult or impossible to control with a selective herbicide. Dallisgrass, foxtails, barnyardgrass, bromegrass, timothy and wheatgrasses are all examples. In addition to forming clumps, tall fescue and switchgrass have heavy fibrous root systems 5 to 12 feet long enabling them to flourish even under dry conditions. Redtop, quackgrass and canada bluegrass survive and spread by underground stems called "rhizomes". Bermudagrass and some bentgrasses spread by "stolons" on top of the ground forming dense patches. Poa annua and nimblewill are off color during the growing season and form brown patches later in the season.

Often professional turf growers rely on the law, Blue Tag Certified or the more expensive Certified Sod Quality standards to prevent the presence of undesirable contaminants in their seed. Many are amazed when they learn many undesirable contaminants are allowed even in Sod Quality seed. In the September and October issues of Golf Course Management, there appeared drawings of 12 monocots and 12 dicots; courtesy of O. M. Scott Company, which are most undesirable in turf. You might be surprised to learn how few of these undesirables are prohibited by law or in Blue Tag or Sod Quality Certified seed. Let's take a look.

PROHIBITED CONTAMINANTS

	By Law	In Washington & Oregon Certified	Sod Quality	Seed Technology
MONOCOTS				
Redtop	No	No	No	U
Poa Annua	No	No	Yes	U
Crabgrass	No	No	Yes	C
Witchgrass	No	No	No	C
Nimblewill	No	No	No	U
Tall Fescue	No	No	Yes	U
Dallisgrass	No	No	No	U
Foxtail Barley	No	No	No	U
Barnyardgrass	No	No	No	U
Goosegrass	No	No	No	U
Timothy	No	No	Yes	U
Quackgrass	Yes	Yes	Yes	U
DICOTS				
Black Medic	No	No	Yes	C
Common Chickweed	No	No	Yes	C
Clover	No	No	Yes	C
Plantain	No	No	Yes	C
Purslane	No	No	No	C
Curly Dock	No	No	Yes	C
Dandelion	No	No	Yes	C
Oxalis	No	No	No	C
Chicory	No	No	No	C
Buckhorn	No	No	Yes	C
Ground Ivy	No	No	No	C
Mouse-ear Chickweed	No	No	Yes	C

Seed Technology has no prohibitive powers and lists all contaminants into 3 groups; U-uncontrollable, C-usually controllable with a selective herbicide and NP-no problem.

The quantity of seed to be examined for each of the unwanted contaminants is very important. By law, in Certified Blue Tag and Sod Quality; only 1 gram(a teaspoonful) would be examined for the presence of all the not prohibited seed listed above. Ten grams (1/8 cupful) would be examined for quackgrass only by law and in BT Certified seed. Twenty five grams(1/4 cupful) of bluegrass would be checked looking for just the prohibited seed; Poa annua is a noteable exception. It being very similar in appearance to other bluegrasses, magnification must be used to detect its presence now making the test a slow tedious process. In BT Certified only 1 gram and in Sod Quality only 10 grams is examined for Poa annua. If no Poa annua seed is found in this 1/4 cup examination, the entire lot, very often several thousand pounds, will be sold to you as Sod Quality and Poa annua free. It becomes increasingly difficult to justify the premium price charged for Certified Sod Quality seed.

TO GREATLY REDUCE THE CHANCE OF GETTING UNDESIRABLE CONTAMINANTS IN YOUR SEED, I WOULD STRONGLY SUGGEST TWO THINGS:

1. Don't rely on the law or certification to provide problem free seed. Buy your seed from a quality firm which offers seed free of ALL undesirable contaminants.

2. POA ANNUA and BENTGRASS FREE seed should be based on more than a 10 gram search. Many quality firms have 25 to 150 grams checked for all contaminants including POA ANNUA. The more seed examined, the less the chance of buying problems.

For years Seed Technology has known of other factors which can better predict plant survival in your fields. However, it was impossible to physically assimilate and express it in a usable manner. A computer is now using the following factors to determine the quality and comparative cost for each lot of seed.

1. Purity--Germination--TZ--All Contaminants.

2. Double Florets - 2 or 3 hulls stuck together. Most of these hulls are empty, no seed inside, lots vary from .5% to 20%.

3. Seed Count - number of seeds per pound. For one elite variety we found a high of 1,112,658/lb and a low of 825,774/lb or a 34.7% variation between the two lots.

4. Dormancy - seeds that are alive but physiologically immature and won't grow. In the fall, lots varied from 2% to 64%.

5. Plant Survival - the germination is based on 28 days of ideal laboratory conditions. The conditions in your fields are considerably more severe. Through research we know that lots germinating 88% in the laboratory have survival rates varying from 48% to 70% when planted in the field.

Seed Technology compared two lots of an elite variety with purities of 97.94% and 98.06% and both germinated 88%. The above factors for both lots were fed into the computer to compute the pounds per acre required to give 3, 6, or 9 plants per sq. inch of soil. For 3 plants, lot one required 42 lbs at $2.00/lb x 100 acres = $8,400. The second lot required only 31 lbs at a cost of $6,200. The difference is $2,200 or $22 per acre for an equal number of plants per sq. inch of your soil.

IN SUMMARY: It is important that you know of ALL the contaminants present in a 25 to 150 gram examination. Then use the computer to select the very best seed at the lowest possible cost.

IT COULD MEAN YOUR SURVIVAL

UNIVERSITY OF CALIFORNIA NEW ZOYSIA VARIETIES

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Despite some highly desirable characteristics such as tolerance of heat, drought, heavy use and salinity, Zoysia has long been the stepchild of turfgrasses in the United States. Although Meyer Zoysia has had a degree of popularity especially in the transition zone where its winter hardiness and disease tolerance are valuable, it has never succeeded in many other areas such as California. Its lack of widespread popularity may be attributed largely to its long dormant period and extreme slowness in establishment. Emerald Zoysia has been somewhat more acceptable in California and parts of the South because it has a finer texture, better cool weather color and a slightly faster establishment rate. No seed propagated strains are available at this time.

In recent years, the need for water conservation has received wide recognition in the turfgrass industry and elsewhere. Many years ago several of us in the University of California concluded that one of the most important future needs of the turfgrass industry would be grasses that were drought tolerant and highly efficient users of water. After evaluating the potential of all the better turf species in this respect, we chose Zoysia and tall fescue in addition to bermudagrass with which we were already working, as the most promising candidates for improvement. Zoysiagrasses are especially efficient in their energy requirements as well as water use.

A series of breeding studies were then initiated with these grasses. Two standard breeding methods were utilized for the Zoysia work; straight seedling selection and hybridization between selected individuals that had been imbred for several generations. In the later method, during the imbreeding process, seedlings were selected for one or more desirable characteristics such as winter color and establishment rate. These selections were then crossed in various combinations in an attempt to bring as many good characteristics as possible together in a single individual. During the course of these studies, thousands of individual plants were evaluated.

We have now reduced our selections to 11 superior vegetatively propagated strains. These are in the final stages of evaluation at this time with a number of California sod producers as well as various research institutions cooperating. We anticipate that we will be making our final selections at the end of the 1982 summer. These strains range from fine textured Matrella types to coarser Japonica types. One or more of each type may be released - each release serving a special purpose or having specific adaptations.

One strain that is almost certain to be released is currently being tested as UCR No. 1. It is a Japonica type resembling Meyer in texture. However, it has a rate of establishment several times faster than Meyer - more rapid than that of any Zoysia we have ever observed. It also has better cool-season color than Meyer, although it is not as good in that respect as some of our Matrella

types. Disease has never been a problem on Zoysia in California so we have little disease information so far on our material. However, Bill Daniel at Purdue has reported that UCR No. 1 was the only strain without rust in his trials last summer. Zoysia rust is a problem in some parts of the United States although it is seldom encountered in California.

We cannot say how widely adapted any of these strains may be. This information will be available only after a number of years of use. We think, at this time, that UCR No. 1 might be adapted throughout most of the area where zoysiagrasses are presently used. However, it may not have the cold tolerance of Meyer. It should be valuable wherever an attractive but rugged wear resistant turf is needed. Its maintenance requirements should be moderately low.

The adaptation zone of the matrella types may be restricted to the milder climate areas of the South and Southwest. They should be especially good for general lawn use where their fine texture and outstanding cool-season color will be important. All strains are drought resistant and efficient users of water.

Zoysiagrasses thrive on heat but perform poorly in areas with consistently cool day and night temperatures such as the central and north coast of California. However, such places are ideal for cool-season grasses, and have no real need for Zoysia.

The California Zoysia strains are all vegetatively propagated. Our studies have shown that stolonizing is the most rapid method of establishment short of solid sodding. Plugging should be used only for off-season planting when survival of stolons may be reduced.

We are presently breeding for a seed propagated strain that would be superior to the common seeded material now available. I am sure improvement will be possible but a number of years of additional work will be required.

WHAT IS AHEAD IN WARM SEASON TURFGRASSES?

by

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The past decade and a half has been highlighted by the release of more than a hundred different cool season turfgrass cultivars. Unfortunately, just the opposite is the case for the warm season turfgrass cultivars. In fact, the only turf type warm season turfgrass cultivar released during the 1970's was Floratam. To further emphasize the point, there has been only one zoysiagrass cultivar released since 1955, only one St. Augustinegrass cultivar since 1957, and no bermudagrass cultivars since 1967. The critical need for improved warm season turfgrass cultivars is obvious.

With this background it is pleasing to note that four new cultivars have already been released during 1980 and 81 with approximately a dozen more to be released prior to 1985. Surely this represents a major step forward for turfgrass culture, and especially for the commercial sod production industry in the sun belt states. Thus, it is appropriate to review the current warm season turfgrass cultivar status and take a brief glimpse of what can be expected in the future. The characteristics described in the accompanying tables of cultivar descriptions are based on rankings (excellent-good-medium-fair-poor-very poor) which are based solely on comparisons among cultivars within that species. The comprehensiveness of the individual descriptions varies from cultivar to cultivar with a considerable portion of the information being given by the specific breeder of the most recently released cultivar. A more comprehensive description of these cultivars will become available as the evaluation of these turfgrass cultivars evolves at the State Agricultural Experiment Station across the southern region.

New St. Augustinegrass Cultivars. The two new St. Augustinegrass cultivars released in the early 1980's are Raleigh and Seville (Table 1). Both possess SAB virus resistance, but lack chinch bug resistance. Further, both have improved cold hardiness compared to Floratam and Floratine. Future planned releases include three cultivars from the Texas AES in 1982 and one from Florida AES in 1983.

New Bermudagrass Cultivars. A review of the bermudagrass cultivars summarized in Table 2 reveals that Vamont was released in 1980 and Tifway II in 1981, with Midmo scheduled for release in 1982. They key with descriptive features of these three new cultivars include (a) improved cold hardiness, (b) use on lawns, and (c) in the case of the first two, use of sports fields and fairways as well. Further, Midmo and Vamont are being released for specific regional adaptations. Whether these newly released cultivars will possess more wide spread adaptation use across the southern United States remains to be seen.

Concerning possible future releases, Kansas AES anticipates two additional bermudagrass cultivars to be released in 1983, while Florida AES also is scheduled to release an improved minimal maintenance bermudagrass cultivar in 1983.

New Zoysiagrass Cultivars. There have been no new zoysiagrass cultivars released since 1963 (Table 3). Meyer and Emerald remain the standards at this point in time. Recently a seeded zoysiagrass selection, known as Korean Common, has become available. It has a medium dark green color, medium coarse texture, and medium low density. The most unique attribute is that it can be established from seed and possesses a superior establishment rate compared to any of the zoysiagrasses which have been used in the United States in the past. The problem is it has only been tested over a two year period at a few limited locations in the United States. Thus, it has not been sufficiently evaluated in terms of its adaptation and use potential throughout the sun belt region. Nevertheless, the development of a technique to achieve rapid establishment of zoysiagrasses from seed which was developed by the Korean turfgrass researchers has great promise for future application in the United States.

In terms of future releases, one is tentatively scheduled from the USDA (Beltsville) in 1982, several from California AES, and one from Kansas AES in 1983.

New Tall Fescue Cultivars. A major breakthrough in the development of turf-type tall fescue cultivars occurred with the introduction of Rebel and subsequent to that six other new turf-type tall fescues (Table 4). As a result of this new breeding effort there will be an even greater increase in the interest of tall fescue in the transition zone. A number of sod producers may become involved in producing both tall fescue and zoysiagrass sod in the middle transitional latitudes of the United States. For the more southerly areas, research over the past six years at Texas A&M University has demonstrated that tall fescue can be a valuable shade grass in humid regions, particularly if irrigation is practiced. Anticipated seed supplies of these improved tall fescue cultivars will be of limited supply for the next few years.

Turfgrass Growth Investigations. Discovery of the spring root dieback phenomenon at Texas A&M University has resulted in major changes in the philosophy of spring turfgrass cultural practices. It is quite likely that a similar situation will evolve in commercial sod production of warm season turfgrass species. Research during the next several years may lead to a change in spring cultural practices including delayed spring nitrogen fertilization, higher mowing heights, and increased irrigation practices during this critical two to three week time period following initial spring greenup.

Growth control investigations have shown that the new growth regulator EL-500, is one of the more promising growth regulators to come along in terms of effectiveness on warm season turfgrass species. Furthermore, it not only reduces the frequency of mowing but also lowers the water use rate in the order of 25 to 45%. This means that once a sod has been fully established but the markets have not developed, it might be possible to lower the costs for mowing and irrigation through the use of growth regulators. Research during

the next few years should confirm whether this is a viable alternative.

New Developments in Pest Management. Bermudagrass encroachment in St. Augustinegrass sod fields is a continuing problem. Based on research at Texas A&M University, asulam has proven effective in suppressing bermudagrass where a directed spray is utilized. This is a more difficult and costly application strategy. Subsequent studies during the past growing season have resulted in the identification of a new experimental compound which shows promise for bermudagrass suppression in St. Augustinegrass through a broadcast application. This new compound will be evaluated in much greater detail at TAMU in 1982 but is only available in very limited quantities and certainly can not be obtained for large scale test applications at this time.

Dallisgrass remains a substantial weed problem. Although several potential new herbicides for dallisgrass control have been identified, none of these newer materials has shown promise for control by simply applying a single application. The problem of crabgrass control in St. Augustinegrass has been alleviated by the development of a 24C label for use of asulam in selected states.

In the disease area, the most recently introduced compound is triadimefon (Bayleton) which has good activity on brown patch, dollar spot, Fusarium blight, and the snow molds. An earlier released compound is iprodione (Chipco 26019) which has good activity on dollar spot, Fusarium blight, Helminthosporium diseases, and the snow molds. Both are welcome additions to the available fungicides for use in turfgrass disease control.

Just recently two new insecticides have become commercially available which are very valuable additions to a limited array of insecticides for use on turfgrass insect problems. One material is bendiocarb (Turcam) which is labeled for use on chinch bug, mole cricket, sod webworm, and white grub. The second is isofenphos (Oftanol) which is labeled for use in the control of billbug, chinch bug, sod webworm, turfgrass weevil, and white grubs, in selected states. Additional pests will be added to these labels along with an expansion to more states as research results evolve.

FUTURE PROJECTIONS

Projecting into the future is a risky business but will be attempted:

1. Reduced production time by (a) chemical bermudagrass suppression in St. Augustinegrass sod production, and (b) development of new zoysiagrass cultivars with significantly more rapid establishment.

2. Reduced production inputs and costs through the development of cultivars with lower water, nitrogen, and mowing requirements.

3. Substantial increase in the amount of zoysiagrass and centipedegrass sod production within five years.

4. Movement away from a monolithic market strategy to a diverse range of cultivars being grown for specific climatic regions and uses.

These developments will be the result of the most active efforts in warm season turfgrass sod production that have ever existed. The turfgrass researchers of the sunbelt look forward to working cooperatively with the sod industry in seeking funds to maximize these research efforts.

Table 1. Characteristics of Six Vegetatively Propagated St. Augustinegrass Cultivars

Cultivar	Released by (Date)	Turfgrass Charasteristics	Adaptation	Pests	Other Comments
Bitter Blue	Developed by private interests in Florida, U.S.	Distinct blue-green color; medium texture, density, internode length, and growth habit	Good shade adaptation; improved low temperature color retention	Susceptible to SAD virus, chinch bug, and gray leafspot	Plant material marketed is highly variable in trueness to type
Floratam (FA 110)	Florida and Texas AES, U.S. (1973)	Blue-green color; coarse texture; low density; long internode length	Poor cold hardiness and shade adaptation; slow spring greenup rate	Resistant to SAD virus; moderate resistance to chinch bug; susceptible to gray leafspot	Poor wear tolerance; improved tolerance to triazine herbicides
Floratine (64)	Florida AES, U.S. (1957)	Blue-green color; medium coarse texture; medium density; medium long internode length; stolons branched; medium low growth habit	Poor cold hardiness; improved low temperature color retention; good shade adaptation	Susceptible to SAD virus, chinch bug, and gray leafspot	Rapid establishment and recuperative rate; improved tolerance to close mowing
Raleigh (NCSA-21)	North Carolina AES, U.S. (1980)	Medium green color; medium coarse texture; medium density; intermediate growth habit; rapid lateral spread	Moderate fall low temperature color retention and spring greenup rates; medium good shade adaptation; moderate cold hardiness	Resistant to SAD virus; susceptible to chinch bug; moderately susceptible, to gray leafspot, downy mildew and brown patch	Rapid establishment rate; moderated vertical leaf extension rate
Seville (S-516)	O.M. Scott & Sons Co., Ohio, U.S. (1981)	Medium dark green color; medium texture; medium high density; low growth habit	Moderate fall low temperature color retention and spring greenup rates; moderate cold hardiness	Resistant to SAD virus; susceptible to chinch bug; very susceptible to gray leafspot	Medium establishment and recuperative rates; intermediate vertical leaf extension rate; moderate seedhead problem
Texas Common		Medium green color; medium texture; medium high density; low growth habit	Good shade adaptation; moderate to good cold hardiness; good spring greenup rate	Susceptible to SAD virus chinch bug, and gray leafspot.	Tolerant of phenoxy herbicides; medium wear tolerance; vegetative sources can vary considerably

James B. Beard Texas A&M University Feb. 1982

Table 2. BERMUDAGRASS CULTIVARS FOR LAWNS AND SPORTS TURFS – VEGETATIVELY PROPAGATED

Cultivar	Released By (Date)	Turfgrass Characteristics	Adaptation	Pests	Other Comments
Midiron (C. dactylon x C. transvaalensis)	Kansas AES, U.S.	Bright, dark green color; medium coarse texture; medium density; semi-prostrate growth habit; poor sod strength	Excellent cold hardiness; poor low temperature color retention; good spring greenup rate; excellent tolerance to winter traffic while dormant	Good bermudagrass mite and spring dead spot resistance; medium good rust and Helminthosporium leaf spot resistance	Rapid lateral spread; low nitrogen fertility requirement; used on traffic areas such as sport fields, tees, and fairways
Midmo (S-16) (C. dactylon x C. transvaalensis)	Kansas and Missouri AES, U.S. (1982)	Gray-green color; medium texture; medium high shoot density	Excellent cold hardiness and drought tolerance; poor low temperature color retention	Susceptible to leafhopper discoloration	Rapid establishment; well adapted to a low intensity of culture; minimal thatching; use on lawns in transition zone
Midway (C. dactylon)	Kansas AES, U.S. (1965)	Gray, blue-green color; medium texture and density; minimum thatching	Excellent cold hardiness; well adapted to the transition zone, especially alkaline soils	Good resistance to Helminthosporium spp. and bermudagrass mite; susceptible to hunting billbug	Minimal seedhead formation; used on lawns from Wichita, Kansas to Amarillo, Texas
Santa Ana (RC-145) (C. dactylon x C. transvaalensis)	California AES, U.S. (1966)	Dark blue-green color; medium texture medium high density; erect leaves; prostrate growth habit; vigorous, tends to thatch	Excellent smog, wear, and salt tolerance; excellent low temperature color retention; moderate cold hardiness	Good resistance to bermudagrass mite	Extensive seedhead formation at low nitrogen levels; good recuperative potential; used on lawns, tees, fairways, and sport fields, primarily in Southern Calif. and Arizona
Sunturf (C. dactylon x C. magennisii)	Alabama, Arkansas, Oklahoma, and South Carolina AES, U.S. (1956)	Dark green color; fine texture; very high density; low growth habit; vigorous growth rate; spreading stolons	Poor low temperature color retention; medium good cold hardiness; excellent drought, salt, and wear tolerance	Susceptible to rust and dollar spot	Nominal seedhead formation; excellent recuperative potential; used on lawns and sport fields, primarily in the southern plains states

Table 2 (continued)

Texturf 10 (T47) (C. dactylon)	Texas AES, U.S. (1957)	Dark green color; medium fine texture; high density; low growth habit; moderate growth rate	Good low temperature color retention and spring greenup rates; excellent wear tolerance; used primarily in the semi-arid southwest - West Texas and New Mexico	Susceptible to Helminthosporium spp.	Minimal seedhead formation; very low nitrogen requirement; moderate establishment rate; used on lawns, sport fields, and recreational areas
Tifway (T419) (C. dactylon x C. transvaalensis)	Georgia AES and CRD-ARS, U.S. (1960)	Dark green color; medium fine texture; stiff leaf blades; high density; medium low growth habit; vigorous growth rate	Good low temperature color retention and cold hardiness; good spring greenup rate; susceptible to smog; widely adapted	Tolerance to bermudagrass mite; susceptible to mole cricket and sod webworm	Minimal seedhead formation; prone to thatching; performs best at medium to high intensity of culture; widely used on lawns, fairways, and tees
Tifway II (C. dactylon x C. transvaalensis)	USDA Coastal Plain Station, Georgia, U.S. (1981)	Dark green color; medium fine texture; high density; medium low growth habit; rapid vertical leaf extension rate; moderate thatching tendency	Excellent fall low temperature color retention and spring greenup rates; good low temperature hardiness	Immune to rust; excellent resistance to Helminthosporium leaf spot diseases	Minimal seedhead problems; rapid vertical leaf extension rate; excellent mowing quality; very good tolerance to close mowing; medium nitrogen fertility requirement; very good tolerance to close mowing; very good recuperative rate
Tufcote (C. dactylon)	Maryland AES, SCS, and CRD-ARD, U.S. (1962)	Medium dark green color; medium texture and density; stiff leaf blades; low growth habit	Good low temperature color retention; good cold, wear, and salt tolerance	Susceptible to bermudagrass mite and spring dead spot	Minimal seedhead formation; good recuperative potential; used on sport fields and lawns in the Mid-Atlantic area
U-3 (C. dactylon)	USGA Green Section and CRD-ARS, U.S. (1947)	Dark grayish-green color; medium fine texture; medium high density; moderately rapid growth rate	Excellent drought and wear tolerance; good cold tolerance; poor low temperature color retention	Susceptible to spring dead spot	Good establishment rate; used on lawns, fairways, tees, and sport fields in the transition zone
Vamont (C. dactylon	Virginia AES, U.S. (1980)	Light green color; medium coarse texture; medium high density; intermediate growth habit; tends to be thatchy	Medium spring greenup rate; good low temperature hardiness		Minimal seedhead problem; rapid vertical leaf extension rate; good mowing quality and tolerance to close mowing; rapid establishment rate; excellent recuperative rate

Ormond, Texturf 1F, Tiffine, and Tiflawn are no longer significant from a commercial availability standpoint.
James B. Beard Texas A&M University Feb. 1987

Table 2 (cont.) BERMUDAGRASS CULTIVARS FOR PUTTING GREENS - VEGETATIVELY PROPAGATED

Cultivar	Released By (Date)	Turfgrass Charasteristics	Adaptation	Pests	Other Comments
Pee Dee (C. dactylon x C. transvaalensis)	South Carolina AES. U. S. (1967)	Dark green color; fine texture; high density; aggressive prostrate growth habit; very prone to thatching	Poor low temperature color retention and cold hardiness	Appears less prone to spring dead spot	Minimal seedhead formation; requires a high intensity of culture; used on greens in the Carolinas
Tifdwarf (C. dactylon x C. transvaalensis)	Georgia AES and CRD-ARS, U.S. (1965)	Dark green color; very fine texture; soft leaf blades very high shoot density; low growth habit	Poor low temperature color retention, turns purple; improved shade adaptation	Very susceptible to smog injury, sod webworm, and spring dead spot	Minimal seedhead formation; requires a medium high intensity of culture; superior tolerance to close mowing; used on greens
Tifgreen (T-328) (C. dactylon x C. transvaalensis)	Georgia AES and CRD-ARS, U.S. (1956)	Dark green color; very fine texture; soft leaf blades; very high shoot density; low growth habit	Fair low temperature color retention; good cold hardiness, drought tolerance and spring greenup rate; excellent wear tolerance; prone to 2, 4-D and smog injury	Good resistance to Helminthosporium spp. and bermudagrass mite; susceptible to armyworm, scale insects, and sod webworm	Moderate seedhead formation at high nitrogen level; requires a high intensity of culture; good recuperative potential; widely used on greens

James B. Beard
Texas A&M University
Feb. 1982

SEED BERMUDAGRASS

Common (C. dactylon)		Medium green color; medium coarse texture; intermediate density	Good wear tolerance; poor low temperature hardiness and color retention; very poor shade adaptation	Very susceptible to bermudagrass mite and Helminthosporium spp.	Requires a low intensity of culture; more compatable in polystands; can be seeded; seed source may vary, certified seed available

Table 3. CHARACTERISTICS OF FOUR ZOYSIAGRASS CULTIVARS

Cultivar	Released by (Date)	Turfgrass Characteristics	Adaptation	Pests	Other Comments
Emerald (Z. japonica x Z. tenuifolia hybrid)	Georgia AES, CRD-ARS, and USGA Green Section, U.S. (1955)	Medium dark green color; fine texture; high density; low growth habit; moderately rapid lateral spread	Poor cold hardiness; intermediate shade adaptation; moderate low temperature color retention; good spring greenup rate	Susceptible to dollar spot	Moderately slow vertical shoot growth and establishment rates; tends to be thatchy and puffy
PI 13521 (Z. matrella)	Alabama AES, U.S. (mid 1930's)	Dark green color; fine texture; high density; low growth habit	Poor cold hardiness and drought tolerance; good shade adaptation	Susceptible to dollar spot, rust, and hunting billbug	Tends to form seedheads; slow vertical shoot growth, horizontal spread and establishment rates
Meyer (Z. japonica)	CRD-ARS and USGA Green Section, U.S. (1951)	Medium dark green color; medium texture and density; reduced leaf stiffness; slow lateral spread	Good cold hardiness; superior wear and drought tolerance; intermediate spring greenup rate and shade adaptation	Susceptible to rust and hunting billbug	Medium vertical shoot growth rate; slow establishment rate; most commonly used in the upper transition zone
Midwest (Z. japonica)	Indiana AES, U.S. (1963)	Dark green color; medium coarse texture; medium low density	Good low temperature color retention and spring greenup rates	Very susceptible to rust and hunting billbug	Moderately rapid horizontal spread and establishment rates; medium vertical shooot growth rate

James B. Beard
Texas A&M University
February 1982

SEEDED ZOYSIAGRASS

Korean Common	South Korea	Medium dark green color; medium coarse texture; medium low density	Good cold hardiness; not yet widely evaluated for adaptation across the United States	Susceptible to rust	Good establishment rate

Table 4. Characteristics of Eleven Turf-type Tall Fescue Cultivars

Cultivar	Developed/Released By (Date)	Turfgrass Charasteristics	Adaptation	Pests	Other Comments
Alta	Oregon AES and CRD-ARS, U.S. (1940)	Medium green color; coarse texture; low density; moderately upright growth habit	Improved drought tolerance; poor cold hardiness	Susceptible to Helminthosporium net blotch and Rhizoctonia patch	Not as persistant as Kentucky 31 under turf conditions
Brookston (7803)	North American Plant Breeders and International Seeds Inc., Oregon, U.S. (1981)	Medium green color; medium fine texture; medium high density; semi-prostrate growth habit	Good heat tolerance and good cold hardiness	Good resistance to Helminthosporium net blotch	Good tolerance to close mowing
Clemfine (LFA-Syn1)	South Carolina AES and Lofts Seed, Inc., New Jersey, U.S. (1982)	Medium green color; coarse texture; medium-low density	Improved heat and drought tolerance; lacks shade adaptation; used in U.S. Southeast	Moderately susceptible to Helminthosporium net blotch	Overall turf quality like Kentucky 31; not as tolerant of close mowing as other turf-types
Falcon (NJ78)	New Jersey AES, E.F. Burlingham & Sons, and Pure Seed Testing Inc., Oregon, U.S. (1980)	Medium-dark green color; medium texture; leafy, medium density; moderately low growing	Good heat tolerance; moderate shade adaptation	Moderate resistance to Helminthosporium net blotch and brown patch; improved crown rust resistance	Suited to a medium to low intensity of culture
Galway (K5-27)	Northrup King Co., Minnesota, U.S. (1981)	Medium-dark green color; medium coarse texture; medium density	Good drought tolerance and shade adaptation; improved cold hardiness	Moderate resistance to brown patch and Helminthosporium net blotch	Suited to a medium to low intensity of culture; good mowing quality; reduced vertical leaf extension rate
Houndog (TF-791)	International seeds, Inc., Oregon, U.S. (1981)	Medium-dark green color; medium texture; medium density; semiprostrate growth habit	Good shade adaptation and fall low temperature color retention; moderate heat and drought tolerance	Moderate resistance to brown patch and Helminthosporium net blotch	Suited to a medium-low intensity of culture

Table 4 (continued)

Kentucky 31	Kentucky AES, U.S. (1934)	Medium green color; coarse texture; low density; slightly prostrate growth habit	Improved heat and drought tolerance; fair cold hardiness; good shade adaptation; well adapted to the transition zone	Susceptible to Helminthosporium net blotch	Forms a medium textured turf under shaded conditions in warm-humid climates
Kenwell	Kentucky AES and CRD-ARS, U.S. (1965)	Medium-dark green color; coarse texture; low density; slower leaf growth rate	Good shade adaptation	Susceptible to Helminthosporium net blotch	Less aggressiveness improves polystand compatibility
Mustang (RP-1)	New Jersey AES and Pickseed West Inc., Oregon, U.S. (1982)	Dark green color; medium texture; medium density; moderately erect growth	Good fall low temperature color retention and spring greenup rates; good shade adaptation	Excellent resistance to Helminthosporium net blotch; moderate resistance to brown patch	Moderate vertical leaf extension rate; excellent establishment and recuperactive rates; good tolerance to close mowing; minimal thatching tendency
Olympic (AGI25A)	New Jersey AES and Pure Seed Testing, Oregon, U.S. (1981)	Dark green color; medium texture and density; moderately low growing	Moderate shade adaptation; less prone to iron chlorosis	Moderate resistance to brown patch; medium-good Helminthosporium net blotch and crown rust resistance	Retains green color at low nitrogen fertility
Rebel (T5&6)	New Jersey AES and Lofts Seed, Inc., New Jersey, U.S. (1980)	Medium-dark green color; medium texture and density	Good heat tolerance and shade adaptation; very good fall low temperature color retention	Moderate resistance to Helminthosporium net blotch; variable brown patch susceptibility	Persists under closer mowing than many cultivars

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