(Continued from page 19)
case, a soil). Theoretically, a lower seeding rate would result in fewer "strong" plants and high seeding rate more "weaker" plants. Eventually both systems reach the carrying capacity of the habitat and further population growth is subject to severe competition resulting in plant death. Ecologically, the loss of an individual plant is more than compensated for by the extended growth of the surviving plants (Lush, 1990). In other words, it truly is a survival of the fittest.

Growth Habit. How about lower than recommended seeding rates? Studies have indicated that grasses with a lateral growth habit from stolons and rhizomes form a more dense and mature turf more rapidly at lower seeding rates. For example, sod growers will typically seed Kentucky bluegrass at 0.25 to 0.75 lb./M (recommended rate is 2 lbs./M) to promote rhizome development that intertwines the sod and allows it to be harvested sooner.

Higher seeding rates to delay stand development is the logic behind the use of cool-season grasses to overseed warm-season turf. Initial establishment is dense and, because of space competition, the plants remain in a juvenile state and are able to tolerate lower heights of cut. Ultimately, the managers do not want an aggressive stand of cool-season grasses to persist, therefore the lack of individual plant and overall stand vigor is viewed as an advantage. Why else would a sane person seed perennial ryegrass at 30 lbs./M (5 times the recommended rate)?

The Bentgrasses. The introduction of more bentgrasses has raised some concerns regarding the establishment and management of cultivars other than Penncross. We have conducted several experiments over the last few years to better understand the response on the new bentgrasses to various seeding rates, with and without fungicide pretreatment.

Clearly, from a leaf texture perspective, Penncross benefits from higher seeding rates that result in a finer texture. However, our studies have indicated that these benefits are not as clear for cultivars such as Putter, SR1020, Crenshaw and Providence that were developed for their fine texture. Only at the 4 lbs. rate does Penncross leaf texture approach the same texture as the newer cultivars.

Morphologically, many of the newer cultivars were developed for more upright growth that would provide a superior putting surface, vis a vis, less potential for grain. In fact, higher seeding rates for the cultivars tested in our trials that were developed for upright growth (Putter, Crenshaw and SR1020) provided a dense turf sooner at slightly above the recommended rates. I am cautious about these results and population dynamics observed in the last year. Recall the earlier mention of carrying capacity and mortality of individual plants.

Population Dynamics. We have observed an increase in seedling survival when bentgrass seed is pretreated with a fungicide (Apron). In fact, the number of shoots per unit area continues to be significantly greater in these plots 1 year after establishment. It has been noted that certain organisms can, for periods of time, overshoot the carrying capacity. However, plants are not known to be one of these organisms.

Plants have the ability to "sense" each other by picking up radiation reflected by nearby leaves and changing their growth characteristics well before their resources are reduced. Eventually, the population will begin to thin itself out and we have begun to see this in our work, specifically with regard to increased disease incidence.

The Disease Perspective. The first experiment we conducted in 1993 supported the work of Madison with respect to seedling density, leaf texture and increase incidence of damping-off pathogens. Therefore, the second run of the experiment included treated vs. untreated seed and we observed significantly less seedling mortality. However, as observed with the first experiment, the higher seeding rate plots had more dollar spot, especially the dollar spot susceptible cultivars such as SR1020 and Crenshaw.

We observed significantly more gray snow mold in 1995 at higher seeding rates and again more dollar spot. Interestingly, there appears to be a consequence to fungicide pretreatment. Invariably, the treated seed at high rates always had a higher disease incidence than the untreated high seeding rate.

Annual Bluegrass Invasion. Recently, researchers in California studied annual bluegrass invasion into the new bentgrass cultivars. The study was seeded at 0.5 lb./M and no data collected until the stand was a year old! Annual bluegrass invasion ranged from 10 to 50% depending on the cultivar. This shines an interesting light on the interspecific competition between bentgrass and annual bluegrass and resulting population dynamics.

Summary. Managing a biological system such as a golf course leaves us at the mercy of the ecological principles at work in nature. While we might be capable of forcing our system to perform outside of the known parameters, such as carrying capacity, eventually the system seeks a balance. As the balance is attained, have we negated the short-term benefit of high seeding rate by creating long-term challenges. If we ignore the ecological principles, we must be prepared to pay the price for the survival of the fittest.

The Maiden Voyage of the Turfgrass Disease Dianostic Lab (TDDL)

By Steve Millett
Graduate Student/Turfgrass Diagnostician

Fall is my favorite season. It is a pleasure to be writing about fall, especially when the heat index for yesterday reached dangerous levels. This summer we endured heat waves that reminded me of the hot and humid weather which I experienced in South Carolina as a graduate student. Hopefully this fall, I can say I endured the summer heat and my strike on baseball. In setting my mind on fall, I endeavor to resist my urge to turn on ESPN's Baseball Tonight or flip on a Cubs game "just to check out the turf." Sweatshirt weather, the changing color of the leaves, spicy apple cider, the excitement of homecoming and of course—Badger football. That splintering crack of the helmet really kicks it all off in my mind. The brats, the beer and the 5th quarter at Camp Randall, that whole Saturday show, are guaranteed to get one in the fall spirit.

And now there is one more reason to look forward to fall: the Turfgrass Disease Diagnostic Lab (TDDL) will be voyaging into new territory. We have successfully overcome many obstacles this summer and now must set new and higher

Steve Millett

goals. It is safe to say that the maiden voyage of the TDDL has been challenging and fun.

For those of you who don't know me, I am Steven Michael Millett, born and raised in the Quad Cities, Illinois (East Moline to be exact). I received a liberal arts education and was awarded my B.S. in Botany from Truman State University (formerly Northeast Missouri State University). My undergraduate thesis involved a floristic survey of Schuyler County, Missouri. I consider myself to be a botanist with a strong interest in turfgrass. During these undergraduate years, I had several jobs: assistant to the herbarium curator, undergraduate research assistant, manager of a lawn and garden center, field intern for Monsanto, and park naturalist for the DNR.

Table 1. Frequency of turf problems submitted by turfgrass professionals (65% of total) to the T.D.D.L. as of Tuesday, August 1, 1995.

Problem	Number Diagnosed
Cultural/environmental	19
Leaf spot/melting out	8
Summer patch	6
Pythium	5
Necrotic Ring Spot	4
Heat Stress	3
Rhizoctonia blight	2
Spring Fusarium	2
Dollar spot	2
Fairy ring	1
Take-all	1
Typhula blight	1
Herbicide	1
Anthracnose	1
Unknown patch	1
Pink snow mold	1
Weed id	1
Freeze/thaw	1

Upon graduating, I continued my education at Clemson University in Clemson, South Carolina. Under the direction of Dr. Bruce Martin and Dr. Graydon Kingsland I earned a M.S. in Plant Pathology. My thesis was entitled " The effects of preemergence herbicides on *Rhizoctonia* blight of warm-season turfgrasses." This work showed that certain herbicides can increase the incidence and severity of Rhizoctonia blight caused by the fungus *Rhizoctonia solani* AG-2-2. This fungus is not the same one that causes *Rhizoctonia* blight of the cool-season turfgrasses grown in Wisconsin, but it is very similar in its etiology. Both of the Rhizocs attack when the grasses are stressed, either in the summer for the cool-season grasses or in the spring and fall for the warm-season grasses. Herbicide application windows in the southeastern U. S. occur at the same time that the warm-season turf is stressed and the fungus is active. This combination leads to an increase in *Rhizoctonia* blight.

The decision to come to the University of Wisconsin was an easy one. The Department of Plant Pathology is one of the world's best; and, upon learning of the O.J. Noer Facility, the decision was made to be a Badger. I have spent the last two years fulfilling the requirements for a Ph.D. The rigorous requirements and my demanding research efforts have been gut-wrenching at times, but it has been well worth it. The creation of the TDDL this past spring has added many new goals and priorities to my agenda. My priorities for the TDDL are to provide quality service and to do so in a manner that is committed to excellence. My responsibilities can be broken down to communication, diagnosis and education.

As of August 1, eighty-four turf samples had been submitted to the TDDL. This is not far behind the the rate at which turf samples were submitted last year to the Plant Pathogen Detection Clinic. We hope the TDDL will break the 200 sample barrier by the end of the year. Of those submitted, 15% came from homeowners, 19% from county agents and 65% from professional turf managers (golf courses, landscapers, and sod producers). By far the most difficult samples came from golf courses, and the root diseases posed the biggest diagnostic challenges. Cultural and environmental problems were the most frequent cause of damage and leaf spot and melting out came in second with 8 samples diagnosed. Table 1 enumerates the turf problems submitted by turfgrass professionals.

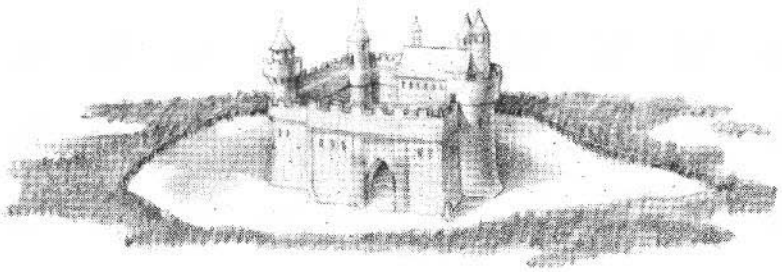
The progression of the seasons brought about changes in the disease picture. The cool wet period at the end of May gave me an opportunity to witness spring Fusarium on *Poa annua.* The question of whether or not this was leftover pink snow mold still has me puzzled. This problem further supported my theory that *P. annua* is a "disease magnet." Springtime also brought necrotic ring spot to the lab. I can understand the frustration Dr. Gayle Worf went through when he was discovering that the causal agent of necrotic ring spot was the fungus *Leptosphaeria korrae.* I could see the fungal structures and the symptoms, but had a hard time isolating the fungus. It took several attempts and frequent conversations with Dr. Worf before I was successful and confident at isolating this slow growing fungus.

True to form for Wisconsin, spring quickly gave way to a hot summer, and heat waves stressed turf throughout the state. These heat waves provided ideal conditions for summer patch. Most of the summer patch problems were new to the sites and all came from golf course greens with a high percentage of *P. annua.* A preventative fungicide program applied when the soil temperatures reach 65° F next spring at the two inch depth, will help to prevent the recurrence of summer patch damage.

While diagnosing summer patch, I was amazed to learn one superintendent had a turfgrass pathology book that I didn't have! Furthermore, Dr. Joe Vargas, Michigan State's most famous Elvis impersonator, had even autographed the superintendent's copy of Management of Turfgrass Diseases just as he had mine at the recent Reinders Conference.

(Continued on page 25)

There Are A Few Things The Sand Pro Can't Do



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My opinions of *Poa annua* have slowly changed this year, as they have every season since I came back to the Midwest. Despite the disease pressure on *P. annua* this summer, it was at times, as Tom Schwab would say, "the best looking turfgrass out there." Charles Darwin's theory on the survival of the fittest and evolution could suggest that *Poa annua* is one of the fittest turfgrasses we have.

TDDL made improvements in communications with county agents, turf managers and homeowners. We have started sending e-mail messages instead of the usual postal forms to county agents. This saves us both time and money, plus it keeps the agents informed of what is happening pathologically in their county. Also, the Department of Plant Pathology and the turf team based at the O.J. Noer Facility have created a catchy new phone number for the TDDL: (608) 265-TDDL (or -8335). So now you have two cutesy phone numbers to remember: Frank Rossi's turf hotline number (608) 845-TURF and now TDDL's. If you haven't called Frank's hotline by now I suggest you try it sometime soon. Frank is fun to listen to.

TDDL research goals include designing and implementing new DNA-based procedures for the rapid identification of turfgrass root infecting fungi. Root diseases are the most difficult and time consuming to diagnose, and diagnosis is hindered by the fact that symptom expression can be at times atypical. This problem is not new to turfgrass pathology but our research efforts in this area are. Dr. Doug Maxwell, with support of the WTA, will be starting this project this fall.

Right now I am in the midst of planning my *Typhula* snow mold research and am anxious to learn more about this evil disease in the coming winter months. Bruce Worzella's article in the July/August issue of THE GRASS ROOTS, "Why not let Scott(s) do it?", got me thinking about the future of turfgrass pest management. This article introduced the Scotts snow mold fungicide application program. Is this what the future holds for us? Will agricultural chemical companies be selling a similar service instead of the actual product? This gives us something to think about. I am looking forward to seeing the Scotts applicator at the Wisconsin Turfgrass Field Day.

I cordially invite you to drop by room 285 in Russell Labs and visit the TDDL. If you stop in I will show you pictures of John Monteith, A. S. Dahl and Gayle Worf from the Department of Plant Pathology's Hall of Fame. Babcock ice cream is right across the street so you can reward yourself with a delicious cool treat. You can also drop in at the O. J. Noer Facility and visit with the turf group. At the Turf Expo in January look for a TDDL report that summarizes all our activities of the year. I imagine there could be some trivia questions taken from this source.

The maiden voyage of the TDDL has truly been a fun challenge. The disease picture has changed with the seasons and is headed into the fall and winter with great momentum. Changes have also taken place in our communication lines in order to better serve the turfgrass industry. Please share your ideas and suggestions with us. Thanks for the ride!

***Points not to ponder.....**

Why doesn't a world class turf program have a natural turfgrass playing surface for their football team? What are your thoughts on this topic? Please feel free to contact me at smm@plantpath.wisc.edu. I know there are turf managers who have an email address.

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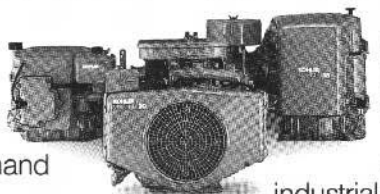

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What's Cooking?

By Bob Vavrek
USGA Green Section Agronomist
North-Central Region

Unfortunately, for many golf course superintendents this summer, what's cooking is the golf course. Unusually cool weather this spring set the table for the intense disease activity and severe heat stress that occurred soon after the early arrival of high temperatures and high humidity in June. The stressful weather conditions arrived early and have not let up all summer. For superintendents in northern Michigan and Wisconsin, this is their first experience with summer patch and pythium.

In fact, just about every major disease that affects cool season turfgrass has been seen this season—and seen again and again and again. Not just a patch or two here and there, but extensive disease activity and combinations of diseases. Not just dollar spot on green banks, but dollar spot and red thread. Not just brown patch on the greens, but brown patch, pythium, anthracnose and summer patch.

Extended periods of unfavorable weather provided ideal conditions for some very nasty plant pathogens. Superintendents in the north are learning what superintendents in the south deal with each season: that under certain conditions of extremely favorable weather for disease activity and when a susceptible turfgrass host is under stress, an application of the proper fungicide does not provide the expected level of protection. A properly calibrated spray carefully applied to, for example, the greens does not afford any relief of the disease symptoms, or, at best, it provided only a day or two of disease control.

At this point, the superintendents who have generally relied on fungicides to provide high quality playing conditions are somewhat dumbfounded, while other superintendents who rely much more on cultural control of turf problems simply roll up their sleeves and continue or intensify the spiking, aerifying, hand mowing, hand watering, and other maintenance practices that they have been doing all summer anyway. The "spiking" superintendent generally hears only the usual grumbling from golfers when midsummer disruption of the putting surface is necessary, because these operations do not surprise anyone. On the other hand, golfers are ready to lynch the "spraying" superintendent as soon as the greens aerifier leaves the shop during July.

So far this summer, the "spikers" are ahead of the "sprayers", sometimes both have lost significant amounts of turf, but the magnitude of the red number next to the fertilizer/pesticide line item of the operating budget at the end of the year is much, much smaller for you know who. What has been learned so far? That techniques such as midsummer aerifying with quadratines, hand watering, raising the height of cut, and spiking can and do work, but more so when they are initiated before extensive losses of turf occur.

It should come as no surprise that mechanical injury from maintenance equipment to turf already under stress from a variety of other problems has been a common concern this summer as well. An interesting note is the "triplex ring" type injury that has been frequently seen at courses using the latest models of hand mowers. The new breed of hand mowers tends to be significantly heavier than the older models and they seem to track so straight and true that they cause injury to the perimeters of greens, just like a triplex.

Courses that utilize hand mowers for greens, though, have generally been under less stress than courses using the triplex units. Obviously, (it should be obvious) when the heavy walker is shaving the greens down below 1/8 of an inch, it makes little difference what mower is being used. Triplex or hand mowers—SLOW DOWN—especially along the perimeters of greens, and don't forget about the benefit of switching from grooved rollers to solid, smooth rollers to minimize stress and injury to the turf—it really works.

Good luck with the rest of the season—think positive—snow is around the corner!

Grasses Can Be Beautiful Too

By Tom Schwab, Manager
O.J. Noer Turfgrass Research and Education Facility

Although the Noer Facility does research on turfgrass and turfgrass systems, our latest plots that were installed will investigate another type of grass. We just planted three beds of ornamental grasses.

Ornamental grasses are a group of plants from the grass (Graminae) family and from closely related families including sedges (Cyperaceae), rushes (Juncaceae) and others. Non-grasses are often included in this group because of the general nature of the term ornamental grass. Ornamental grasses' other feature is obviously that they are ornamental or showy in the landscape. In that sense, turfgrass could be considered the most popular of all ornamental grasses. Golf course managers use turfgrass to create extremely beautiful settings!

Our study will be looking at more true ornamental grasses which are showy grass and grasslike plants as they are permitted to mature, flower, and exhibit their natural features. Their decorative features allow them to be used in flower beds, mass plantings, or as unique specimen plants by themselves.

Ornamental grasses have always been interesting to me, but I thought only a few did well in our climate. A recent six year winter hardiness study at the Minnesota Landscape Arboretum found 85 out of the 165 ornamental grasses studied can be grown successfully in USDA Zone 4. That zone covers all but the northern 1/5 of Wisconsin. I also hope to get some of these ornamental grasses studied at one of our far northern UW Ag Research Stations to investigate survival in Zone 3. If there is a superintendent near the Minocqua or Spooner stations who would be willing to help with this study, please call me at 608-845-6536.

The uses of ornamental grasses are endless. They can be used singularly or in combination in mass plantings. For example, the grasses in a prairie are ornamental grasses. Some ornamental grasses can grow to be 8 feet tall. Those taller ones can be used as specimen plants to achieve some diversity, where you might otherwise use small trees. A flower bed is not complete without the use of some grasses. They can either soften a garden or make it more dynamic with their colors of blue, yellow, bronze and red as well as variegated white and yellow.

The University of Minnesota reported on ornamental grasses' other desirable traits. They reported very few insect or disease problems and low nutrient requirements. Another feature reported was multiple season interest with their foliage, flowers, and texture. They grow fast. Some large plants grow 5 to 8 feet tall by the second year. Lastly reported was their movement in the wind which provides interesting sound and beauty.

We began planting the three demonstration areas of ornamental grasses at the Noer Facility in July, 1995. These plants came from another demonstration plot that was started at the Noer Facility in 1994. In August, 1995 we planted an additional group of nursery stock ornamental grasses. These were

Starting at the foreground and moving away from there are golden-edged prairie cord grass fountain grass, ribbon grass and Foerster's feather reed grass. This planting is at the NOER Facility.

The E.B. Fred house is the focus of the Allen Centennial Gardens on the UW-Madison campus. The house, formerly the home of Dr. Fred who was CALS dean and UW president, is now headquarters for the ARS of the UW-Madison. It is worth a trip to see and tour and enjoy and learn.

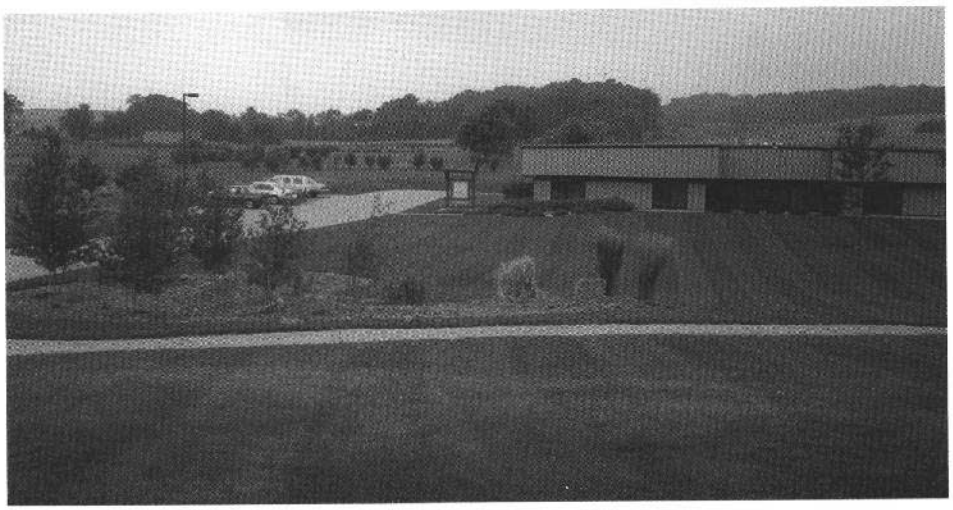
donated by C/R Stephenson Company, Madison, Wisconsin. Eventually the areas will comprise 25 different genera and over 100 different varieties of ornamental grasses. There are plans to install two other demonstrations at the Noer Facility in the future to feature ornamental grasses that need deep rich soil and ones that thrive in wet soils.

The strategy we used in the design of the Noer demonstration was to place the plants in their natural settings: shade loving plants were placed in the shade, dry loving plants in dry, etc. Most of the plants also grow in groups naturally so we placed most varieties in groups of three. All of the plants were mulched with 3" of shredded oak bark. We also planted them in shallow silt loam soil that was not modified with amendments.

The demonstration includes commonly used ornamental grasses for our climate and less common ones to evaluate their performance. We will be observing hardiness, desirable features, and negative features. Desirable features on shape, size, and color of flowers and foliage will be observed. A negative feature may be invasiveness, depending on whether you want to contain the plant or let it spread. Plants can be invasive with aggressive rhizomes and stolons or by being prolific self-sowing seeders. Invasive plants may have to be contained with either physical barriers or with vigilant weeding. John Greenlee, the author of *The Encyclopedia of Ornamental Grasses* reports that only a small percentage of these grasses are potentially weedy.

The University of Minnesota publication states that for northern climates, the best time to plant ornamental grasses is in the spring. This time frame leaves you plenty of time to read up on how to best incorporate a planting for yourself next spring. Two excellent resources that I'm using to learn about ornamental grasses are *The Encyclopedia of Ornamental Grasses* by John Greenlee and the University of Minnesota publication *Ornamental Grasses for Cold Climates* by M. Hochenberry Meyer, D.B. White and H. Pellett. These publications have information on every aspect of using ornamental grasses. You will definitely want to get both before you start using ornamental grasses. We're also hoping that the new demonstration at the Noer Facility will give you more confidence and information to use a greater variety of these plants in your landscapes. Then the next time it gets to be the middle of a tough summer and you're starting to hate grass you can be reminded that grasses are beautiful too.

The O.N. Allen Centennial Gardens on the UW-Madison campus include this fabulous and graceful ornamental grass garden.



Use this photo of the NOER Facility as a reference, as the ornamental grass planting in the foreground matures in the years ahead.

THAT GIRL

By Monroe S. Miller

He hung the phone up, propped his feet comfortably on the corner of his desk, leaned back in his oversized office chair, and smiled.

The president of the Liberty Prairie Country Club had just called to tell him the club's choice for a new superintendent was the individual he had recommended to them. "You have chosen an excellent person," he told him.

"I know we have. Thanks for your help," the club official offered.

And Jean Brodie was an excellent choice for Liberty Prairie CC. He was glad the club had the wisdom to look past convention and hire a woman as their course manager. She won't be the first female to run a Wisconsin golf course, but she will be one of the very few.

Only a couple of times before had he given a former employee a "without reservation" recommendation. That required a lot of confidence in the candidate, and he had no doubt about Jean's success potential. "A sure bet," he said.

She may not be a pioneer in her new position, but she sure was when she had joined his staff several years ago. She was the first girl on his crew, the first after many seasons of an all male staff. No matter how you view it, she was breaking new ground when she started.

He smiled as he thought back to those first days after her arrival. He still was amazed at how the presence of a thoroughly pleasant, petite and good natured individual affected the atmosphere in his shop. She inspired a sort of civility that wasn't always present when it was an all guys scene.

From the very start, he had liked her. She had a really good work ethic, probably the most important requirement for him. No one else had noticed, but within days he had figured out her secret for getting so much work done in a day, more than almost any other staff person. From daylight to quitting time, she worked at exactly the same speed. It was a reminder of how the older retired farmers he'd had over the years worked. Not fast. Not slow. Persistently. Many times, in those first days, he thought to himself "that girl is going to be alright."

The file folder with his letter of recommendation to Liberty Prairie about