FLUORESCENCE *(from page 26)*

dividuals responsible for formulating and making recommendations.

One of the techniques that can be very useful is the fluorescence test. It provides seed analysts a means of detecting inferior ryegrass contaminants in certain improved turf-type varieties. Among the ryegrasses presently available, the fluorescence test can be very useful in detecting contamination in the variety Manhattan which is gaining widespread recognition for its superior performance. Seedlings of annual ryegrass as well as certain perennial ryegrasses give a positive test when subjected to the fluorescence test. Fortunately, Manhattan ryegrass seedlings are different in this respect in that they do not produce a fluorescence when subjected to the test. Therefore, by this test, a means is provided by which contamination of the Manhattan seed with interior types could be easily detected.

The inclusion of the percentage of fluorescence on the seed label that is required by state and Federal seed laws would prove to be very useful. Seed analysts would be able to readily detect contaminating ryegrasses in varieties that do not produce the fluorescence test. It would provide very useful information to individuals in the extension service responsible for making recommendations of varieties of superior performance. And perhaps most importantly, it would provide the purchaser an assurance of the genetic quality of the seed.

Flourescence And Ryegrass Breeding

By Dr. C. Reed Funk

The plant breeder is charged with the responsibility of developing the best variety attainable, using present genetic resources and plant breeding techniques. Thus, he is concerned that the merits of the variety are not lost by improper standards of seed in increase and distribution. It is therefore necessary for the plant breeder to work very closely with quality-conscious seed producers, certification specialists and seed control officials to see that quality seed of a new variety is made available to the consuming public.

The maintenance of high standards of seed production are especially important in a cross-pollinated species such as perennial ryegrass. Ryegrass seed is often produced in fields badly contaminated with annual ryegrass or stemmy, hay-type perennial ryegrass or adjacent to areas shedding pollen of these inferior types. Even a slight mixture of these coarse, tall-growing ryegrasses can cause a serious reduction in the turf performance of an improved, fine-textured, lower-growing, turf-type variety.

The improved, turf-type ryegrasses are basically poor seed producers in comparison with the annual and hay-type, perennial ryegrasses. Thus, natural selection will cause a further rapid deterioration of the turf performance potential of the improved variety as such seed fields continue to remain in production.

To insure quality seed production of improved varieties the plant breeder in cooperation with the seed producers and the certification agency places strict standards on field selection, isolation requirements, stand life and generation interval.

In the case of a synthetic variety such as Manhattan perennial ryegrass, Breeders seed is produced from vegetatively propagated parental clones grown in a clean, isolated crossing field at Rutgers under the direct supervision of the breeder. This Breeders seed is used to establish an isolated "Foundation" increase field in Oregon which is grown under constant supervision of official state inspectors and hand rogued to remove any objectionable plant.

Certified seed must be grown only from Foundation seed in isolated fields. These fields must be essentially free from contamination by other ryegrasses and weeds and maintained according to certification standards.

The fluorescence test has been widely used in seed-testing laboratories for many years to distinguish between annual and perennial ryegrass. The seedling roots of annual ryegrass normally secrete a substance which shows a brilliant fluorescence under ultraviolet light. This characteristic results from a single dominant gene present in most annual ryegrass plants. Because this dominant gene can also be found in occasional plants of common perennial ryegrass and many of our older varieties, seed analysts and control officials have not been able to use this test as precisely as desired in their efforts to detect annual ryegrass contamination of perennial ryegrass seed (Nyquist 1963).

Breeders of some of the new fine-textured varieties of perennial ryegrass such as Pennfine and Manhattan realized the importance of being able to precisely detect any contamination of seed lots by unsightly annual ryegrass. With the helpful cooperation of seed analysts, these new varieties have been bred to be completely free of the dominant gene causing fluorescent seedlings. Any fluorescent seedling appearing in a seed lot of Pennfine or Manhattan immediately signals contamination. Therefore, plant breeders, quality conscious seed producers, certification agencies and seed control officials have one more tool to use in their joint efforts to provide the buying public with a superior product."

REFERENCES

1. Funk, C. R., R. E. Engel and P. M. Halisky. 1969. Registration of Manhattan perennial ryegrass. Crop Science 9:679-680.
2. Nyquist, W. E. 1963. Fluorescent perennial ryegrass. Crop Science 3:223-226.

Flourescence In Ryegrass Certification

By E. E. Hardin

After a variety has been developed through selection and/or breeding, production and market development are the next steps a variety must take on its way to the consumer. In order to grow a certified variety of perennial ryegrass in Oregon, the grower must plant Foundation seed stock on land which has not grown nor been seeded to any other perennial, ryegrass during the previous five years, unless the previous crop was of the same variety and passed the certification requirements. The field must also be free of *L. multiflorum*, and there must be adequate isolation to prevent crossing from outside pollen sources. A certified seed field must pass a Seedling inspection within sixty days after the initial planting, and a Seed Crop inspection prior to harvest of each crop.

The certification inspector looks for out of place and off-type seedlings of other ryegrass as well as isolation infractions during the pollination period. After harvest, a lot of seed must meet the mechanical purity requirements as established by the Seed Certification Service.

It is the intent of all concerned

(continued on page 52)

These seedlings are about six weeks old. Note the differences in color and height. The Manhattan and Pennfine varieties are fine-leaved, shorter growing and darker green. Photo was taken by Dr. C. Reed Funk.

FLUORESCENCE *(from page 28)*

with the production of seed to see that high standards are maintained in the various steps of production. This assures the ultimate consumer the best possible product when he seeds his turf. Seed testing is that step in production which critically examines the seed for physical impurities. This information appears by law on all containers being offered for sale.

To the extent possible, seed analysts examine the seed for mixtures of other similar kinds of seed. For the best assurance one should use certified seed. Under such a program, a certification agency carefully documents the pedigree of the seed and supervises the growing conditions to prevent outside contamination. It provides an unbiased person to keep a check as the crop is growing.

Once the seed is harvested, cleaned, and in the bag, a sample is drawn and sent to a seed testing laboratory for a detailed analysis. Some seeds or seedlings have characteristics which differentiate them from other kinds. This becomes a useful laboratory method of detecting contamination. The fluorescence of annual ryegrass roots when observed under ultraviolet light is one of these characteristics.

Generally, perennial ryegrass roots do not fluoresce under the same light. Consequently, these two kinds can be separated on this basis at a very early stage of their development.

Four hundred seeds are planted on white filter paper and provided optimum conditions for germination. Complete germination is usually accomplished within fourteen days. The roots of these same germinated seedlings are observed under ultraviolet light and recorded as a percent of fluorescence or non-fluorescence. This information is then calculated into the purity reflecting any contamination which may be present.

New ryegrass varieties being developed do not necessarily exhibit this same fluorescence, but exhibit their own characteristic pattern. This pattern remains useful because once it is established it remains relatively constant, acting similar to a finger print. Any deviation from this pattern indicates the presence of contaminants. All of which provides us with more tools in our endeavor to provide information which allows the ultimate consumer the opportunity to buy the quality of seed he desires.

Flourescence And The Federal Seed Act

By C. R. Edwards

Conscientious seed producers take a great deal into account when producing certified seed especially of the new turf-type perennial strains. It is, however, also evident and relatively easy for less discriminating growers to produce noncertified

(continued on page 58)