Seed Vigor Testing Using Computer-aided Image Analysis

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INTRODUCTION

Standardized seed vigor tests must be developed for greenhouse-grown flower species. Current vigor tests used to evaluate large-seeded agronomic crops are generally not useful for evaluating smaller-seeded flower species. One alternative is to use radicle length in seedlings grown under controlled environments as an indicator of seed vigor. For that purpose a seed vigor test was developed that uses digital images taken using a flat bed scanner to measure radicle length in small-seeded flower species. The superior resolution of the flat bed scanner for collecting images has allowed for easy computer-aided measurements of the small seedling parts seen in flower species. A novel, clear substrate that provides similar moisture holding properties to standard germination blotters used by commercial seed analysts has allowed for quick image acquisition without removing seedlings from the Petri dish. In addition, improved commercially available software allows for accurate analysis of radicle length regardless of growth orientation or radicle overlap in the Petri dish; thus avoiding the need to grow seedlings on an oriented, slant-board. Correlations between seedling growth (radicle length, total seedling

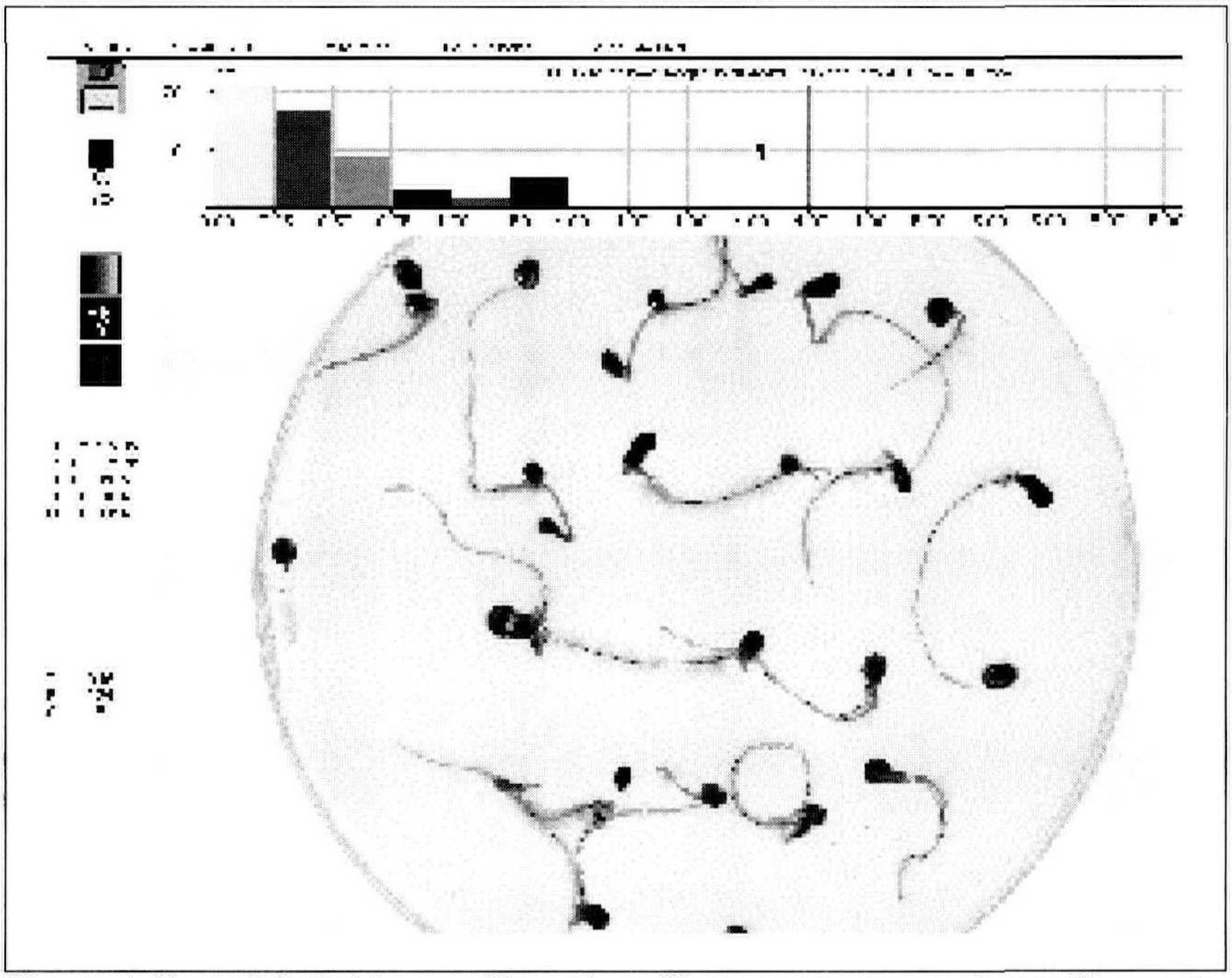

Figure 1. Typical digital image of impatiens. The computer traces the seedling parts.

length, total seedling area) with other vigor tests (saturated salts accelerated aging) and greenhouse plug flat emergence show this method to hold promise as a standardized vigor test.

METHODS

Seeds were germinated on either blotter paper, germination paper, or a clear medium in petri dishes. Seedling length was measured using digital images captured on a flat bed scanner and analysis software from Regents called Rhizo.

RESULTS

A key aspect of this research was to develop a germination medium that is clear to allow flat bed scans of germinating seeds in the Petri dish. Figure 1 shows a typical flat bed scan through this clear medium.

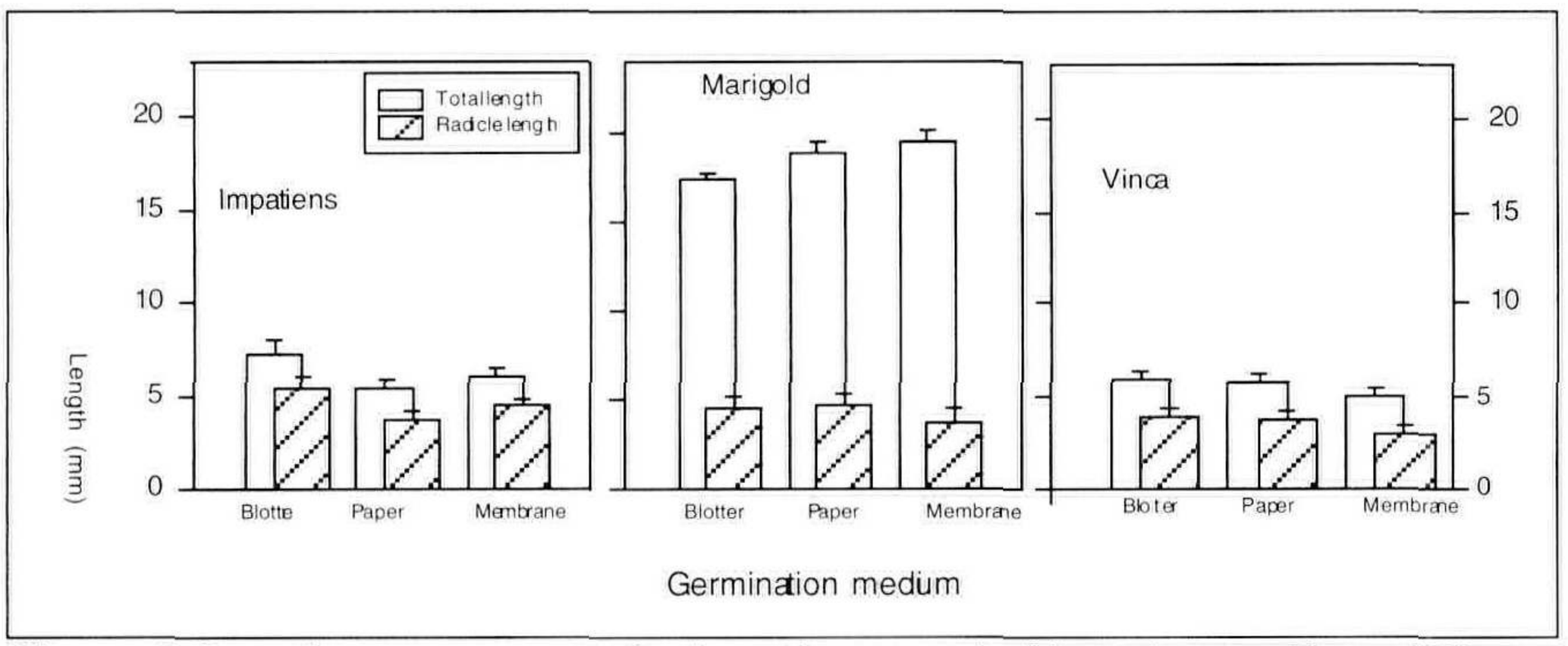

Figure 2. Length measurements for impatiens, marigold or vinca on three different germination media.

In addition, it was shown that seeds of impatiens, vinca, and marigold all germinated in a similarfashion on all three germination media evaluated (Fig. 2).

Computer-aided imagery was used to measure radicle lengths after 7 days in a petri dish standard germination test and correlate that length with other measures of seed vigor. For two seed lots of *Viola ×wittrockiana*, pansy, radicle length was consistent with the vigor status of the seed lot (Table 1).

Table 1.

Seed lot	Standard germination (%)	Germination rate	Radicle length	Greenhouse plug test (%)
1	77	13	14	59
2	87	15	19	93

This system is an improvement over other attempts to use computer-aided assessment of digital images because it provides digital images that do not vary due to external lighting; it uses software that can evaluate radicle length in a Petri dish assay that does not require a slant-board for straight radicle growth; it relies on standard germination techniques used by every seed lab; it uses a clear substrate to replace the opaque blotter to allow digital images to be taken within the Petri dish; and accurate measurements of seedling parts is performed in under 2 minutes per Petri dish.

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Use of Compressed Hardwood Sawdust Pellets as a Weed Control Mechanism for Container Plants

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INTRODUCTION

Weed control in container plants can be a daunting task. Nurseries which only grow one type of plant can easily find suitable chemical herbicides for effective weed control. However, smaller more specialized nurseries, such as Lorax Farms, with literally hundreds of different species must carefully considered the choice of herbicides. Alternative methods do exist and the theory is straight forward. Many of our most annoying weeds depend upon light for adequate seed germination — excluding the light automatically stops seed germination. The late Jim Cross of Environmental Nurseries used pine straw as a mulch for container plants, others in my experience have used cocoa shells a costly but effective mulch material. In both cases the mulches were effective at inhibiting light from reaching the weed seeds. Articles in *American Nurseryman* and the *Journal of Environmental Horticulture* suggests that pelletized paper might make for an effective mulch (Smith, 1998 and Smith et al., 1998). While the literature suggests that it is effective, the pelletized paper, like the cocoa shells, is expensive and it shares a lack of availability with pine straw in the Northeastern part of the U.S.A. Pelletized wood is readily available and seemed to be a reasonable alternative to the previously mentioned materials

METHODS

Fifty hybrid *Hemerocallis* plants with clean soil and no weeds were treated with the volume equivalent of 400 cc of hardwood pellets by spreading the pellets evenly over the soil. Alternatively, an equal number of *Hemerocallis* plants with clean soil were selected as a control with no other additives. The pellets were watered soon after they were applied and expanded approximately three-fold. After 3 months of normal growing conditions outdoors the plants were tabulated for weed control. For the plants treated with the pellet mulch there was no indication of reduced growth or