

# The seeds of success

Good seed viability is one of the key factors determining the success of a vegetable crop. In any situation quick and uniform emergence of seedlings reduces the risk of trouble below the surface and establishes the crop ready for it to grow to fruition for a high yield of uniform product.

The days of high volume seed use and excessive inputs in the establishment and growing of commercial vegetable crops are long gone. The economics of growing for a profit require that every chapter in a crops life is monitored for efficiency and that costs of inputs are fully justified. For example if seed were simple to produce then a target of one thousand uniform, vigorous and healthy plants from one thousand seeds would be an easy objective. Most producers are trying to achieve this.

## Why is it so important?

Accurate plant populations, from either transplanted or direct drilled crops, are required not only to maximise total yield potential of a crop but also to determine uniformity of maturity and size of the marketed product. In a cauliflower crop one missing or smaller plant has a non-competitive effect on all those around it leading to extra growth and variation in head size and maturity. Uniformity of plant stand of an onion crop determines the proportion of size grades produced at the end of the day with a subsequent effect on returns. Onions are drilled in order to maximise cropping potential often in conditions that are less than ideal. The ability of seed to establish well is critical to success.

In the same way the uniformity of seed establishment also enhances the potential of the crop in its ability to bequeath equal competition between plants from the beginning to give a consistent product at harvest time. Any differences at the seedling stage can only be accentuated as the stronger plants are better able to compete. This is especially the case if

*On behalf of HorTIPS, Hugh Poths horticultural consultant, looks at good seed viability*

any limitation to availability of inputs, such as water or fertiliser occurs. As machinery plays an ever-increasing role, not only at harvest, but also in the preparation and packing process, so the ability to make product more acceptable to mechanical processes is critical and uniformity is a key issue. Variation in emergence and therefore in seed performance needs to be minimised to achieve the best crops.

## Testing times

Production of seed is carried out in carefully selected locations with both volume and quality of harvest of paramount importance in a competitive market. However the product of this harvest is of a delicate nature and prone to the effects of variation in a range of climatic conditions. Seed is after all a bundle of living tissue with a life span reliant on the conditions around it both before and after separation from its parent plant. The fact that so much variation occurs reduces the predictability of both yield and quality of the harvest making it necessary to subject every production to a series of tests to ensure that the best



*Andy Richardson of the Allium and Brassica Centre believes that good seed quality is needed to get the best from onion crops*

*Uniform emergence of brassica seed improves crop performance*

potential can be realised. Monitoring quality as seed progresses from harvest through cleaning, grading, separation and other processes is also normal practice for the same reason.

The most useful measure of the likely performance of seed is the result of a germination test. This test is carried out to a standard set of rules, specific to each crop, as defined by the International Seed Testing Association. It ensures that those results are repeatable and consistent between testing stations and enables commercial decisions to be taken regarding the usefulness of the seed lot. This test is carried out to measure the maximum potential in a carefully controlled environment and normally includes two counts over the test period.

While the final figure produced by counting the successfully germinating seed gives the total potential, the interim count can vary considerably on its way to producing the final figure. Careful interpretation of the difference between the two, in other words the speed with which germination occurs, is often used as a guide to viability and eventual performance although this is not always reliable when related to field performance.

## Seed vigour

It would be very convenient if all seed was sown in ideal conditions, either in the propagating

house or in an open field situation, but unfortunately this is often not the case. Temperature, water and air are the most obvious elements to have an effect on seed growth but disease and pest problems, together with the side effects of some chemical protectants, all play their part. A germination figure indicates potential in ideal conditions but often an indication of potential for seed to cope in difficult conditions is required and this can be defined as vigour. Describing the preferred characteristics of good vigour is easy: testing of a range of seed types to give repeatable and consistent guidance to their ability to perform in a wide range of situations is more difficult.

Research in the past has been carried out to confirm just how much variation in vigour levels can exist within a seed type and how this may relate to subsequent cropping characteristics. More importantly this work has enabled methods of comparing higher with lower vigour to be formalised so that recognised tests are now available for general use, although there is no obligation by a seed supplier to provide vigour data. Uniformity of vigour within a lot can also be assessed. Commercial decisions can be made based on this data but results are often given in relative terms and not considered to be as repeatable or consistent as germination figures. Specific crop tests have been developed for seed of peas, beans, carrot and lettuce and most vegetable crops can be assessed using the controlled deterioration test.

## Testing, testing

The pea test is based on the concentration of salts released from the seed into a sample of water, which is then tested for its electrical conductivity. The bean test is carried out by assessing the proportion of complete cotyledons stained by a chemical with special properties, called tetrazolium chloride. Seed with the better potential, of both crops, is normally used for early drillings when cooler and wetter soils present more of a challenge leaving other seed for use in improving conditions.

One test for carrot vigour involves the measurement of seed embryo length. A standard sample is taken and the range of size determines the variation within a seed lot. This is used to define the likely uniformity of later plant growth. The lettuce slant board test compares seed lots from one variety using seedling root length to indicate which will have the better early plant vigour. This type of data gives the opportunity to choose seed that will produce the better commercial crop.

The basis of the controlled deterioration test is an ageing technique which exposes the sample to the two most important variables that influence deterioration - namely temperature and moisture. Moisture content is raised to a consistent, pre-determined level before high temperature treatment takes place for a specific period of time. The precise details vary with species. Comparing the result of a standard germination test after this treatment with the result before treatment indicates how well the seed has coped with adverse conditions although it is not able to give an accurate indication of uniformity of establishment. This vigour score relates to its potential for subsequent field and storage performance.

Seed quality issues have never been so important. Pressure on profit margins increases the emphasis on maximising the yield of saleable, top quality product while minimising costs. At the same time we have to remember that seed is a living organism and we have to respect that fact when we grow, test, store and use it. There is more to be learned before we can expect to achieve optimum performance, from such an important input, given the wide range of conditions in which we expect it to grow.



The subject of seed vigour will be covered further at the HorTIPS Seed Quality and Establishment Conference to be held at the Newark Showground on January 23 2002. Speakers include Andy Richardson and other industry specialist. Tickets for the day cost £15 and delegate places can be booked on telephone 0118 9318294 or email horttips@reading.ac.uk



*Rae Cook of Elsoms Seeds believes that seed quality is an essential factor in the start of any crop*

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