In 2014 the herbicide testing group at AU Flakkebjerg conducted 104 field trials. They comprised 74 trials in agricultural crops, 23 trials in vegetables, fruit, berries and garden seed and 7 trials in nurseries, Christmas trees and on uncultivated areas.

Materials and methods
All testing trials are conducted as field trials. Most are sited with farmers to meet special requirements regarding soil and composition of crops and weed flora, but a small number of trials are located at AU Flakkebjerg’s own fields. The majority of the trials were located in Zealand but a few are conducted in Funen and Jutland. Since 2009 a small number of trials have also been conducted in the South of Sweden. All trials are conducted as GEP trials with 4 replicates and in accordance with EPPO guidelines. Trials are conducted as tolerance/yield trials or efficacy trials, but in some trials both efficacy and tolerance are recorded. This applies to growth regulation trials and most of the trials in horticultural crops. When efficacy trials are laid out, the aim is to find areas with considerable weed populations in the form of many weed species, often also certain “target weeds”, whereas the aim is to find areas with no or a very small weed population when tolerance/yield trials are laid out.

In the agricultural crops a self-propelled trial sprayer is used, which is standardly equipped with Hardi lowdrift fan nozzles. Usually, 150 l of water per hectare and a pressure suitable for a driving speed of 4.5 km/h are used. In the horticultural trials various types of sprayers are used depending on the crop and the task, but generally fan nozzles and 150-200 litres of water per hectare are used.

There is a growing tendency as regards the agricultural trials that the company ordering the trials decides which recordings are to be made in the trials and when. In the weed trials the efficacy of the herbicides is normally calculated either through visual assessments or by counting and measuring the fresh weight of the individual weed species in 3-4 sample plots of 0.25 m² per plot. Counting and weighing of the weeds are at the earliest conducted 6 weeks after finalisation of the spring sprayings, and as regards the autumn sprayings this recording is conducted 2-3 weeks after growth has begun in the spring. The assessments of efficacy are typically conducted approximately 2 and 6 weeks after spraying, but they can also be placed at other dates according to the wishes of the company ordering the trial. At the same time damage to the crop is also assessed. During the growing season assessments are made another 1-2 times; for cereals and grass seed it is established that the assessments are made at earing and immediately before harvest. The recordings are the same for efficacy and selectivity trials; however, the yield is only measured in the selectivity trials.

In the growth regulations trials assessments of crop damage, lodging and crop height are made until harvest at intervals of approximately 3 weeks after spraying in grass seed and earing in cereals, respectively. In cereals the recording of crop height is conducted through measuring, and in the same crops assessments are also conducted of straw and ear breakage. The yield is always measured in growth regulation trials.

Small crops (vegetables, fruit, berries, nursery, horticultural seed, Christmas trees, etc.) are generally more susceptible to herbicides than the agricultural crops, and therefore assessments of damage are
conducted more often and at shorter intervals. Typically, assessments will be made 1, 2 and 4 weeks after treatment to record acute damage, while assessments in the interval of 4-16 weeks after treatment aim to record how quickly the crop recovers after the damage. Experience shows that early recorded damage that disappears quickly may be at a relatively high level without loss of yield or negative influence on quality, whereas more lasting damage may be at a lower level, yet still with a negative influence on yield and/or quality. The effect on weeds is recorded as in the agricultural crops. Subsequent weeding is necessary in most cases. The reason for this is that the horticultural crops are often less competitive than the agricultural crops, and therefore weeds in the untreated plots and not controlled weeds in the treated plots will often affect the yield negatively. If the weeds are not removed, it will be difficult to determine whether any recorded differences in yield are caused by the weed pressure or the effect of the herbicides.

Results – herbicides in agricultural crops 2014
More than half the trials were conducted in cereal crops and all were financed by the agrichemical companies. The same applies to forage maize, in which there were relatively many trials in 2014, and to winter oilseed rape, potatoes and beets. The trials in grass seed were financed by the GUDP project "3030 i 2020 – mere græsfrø med relativt mindre input" (Green Development and Demonstration Programme project “3030 in 2020 – more grass seed with relatively less input”).

Results – herbicides in small crops 2014
The trials in small crops are to a great extent financed directly by the industry in Denmark or by foundations related to the industry. The trial unit has also conducted an increasing number of trials in Sweden in recent years. Within the field of small crops many herbicides have disappeared from the market over a number of years and only few new ones have been added, and Danish and Swedish growers share this problem. Due to a small market the agrichemical companies have relatively little interest in the small crops, and this seems to be intensified after Denmark has been placed in the North Zone in connection with EC Regulation 1107/2009. Financing of testing and development of new herbicide strategies in small crops is thus by now a task for which the industry itself is mostly responsible.

Due to a critical herbicide situation in many small crops the main purpose of the weed trials has for some years been to find alternatives to herbicides that have disappeared from the market or are feared will disappear in connection with new criteria in EC Regulation 1107/2009. In vegetables the main activities since 2009 have thus concentrated on developing strategies without pendimethalin in seeded onions, carrots and parsnips (Stomp and others), ioxynil (Totril) and tepraloxydim (Aramo). A very large part of this development work has been conducted in Sweden. In strawberry the prospect of losing Stomp is one of the motives behind the trials, while there has been a search for many years for an alternative to asulam (Asulox) in spinach for seed production. Fruit production is not at an immediate risk of losing herbicides. On the contrary, in recent years several authorisations have been given for minor use, and therefore work has been going on in fruit in recent years to develop weed control that is tailored to the needs.
Weed control in seeded onions is just about the most difficult job in weed control. The slow growth and weak competitiveness of onions and their general susceptibility to herbicides make weed control in onions a subject for specialists, and they now face major challenges. The most important herbicides for onions are thus expected to disappear from the market in the years to come and they must be replaced by other herbicides. Experiences from trials in recent years suggest that these herbicides are less effective against weeds and that onions are less tolerant to them.