Scanning report
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Country:	Denmark
NUTS 3 region(s)[1]:	DK011 (Copenhagen), DK012 (Copenhagen and its environs), DK013 (North Zealand), DK014 (Bornholm), DK021 (East Zealand), DK022 (West- and South Zealand), DK031 (Funen), DK032 (South Jutland), DK041 (West Jutland), DK042 (East Jutland), DK050 (North Jutland).
WP no. and title:	WP5 Secure sustainable fruit production
Date:	[25-05-2016]
	[Y1 report due May 2016 for the period 03-16 to 05-16]

Source materials and methodology

Methods and selected sources

Initial consultation with colleagues at Aarhus University, Dept. Food Science to identify staff involved in research on relevant topics. Then collection of publications and disseminations from the last approximately two years to provide a start for the state of art. The personal database over publications/disseminations (PURE database) for each scientist was used as basis. Similar was done for Copenhagen University (KU PLEN) for the few scientists involved in fruit and berry research. Very little activities on the applied topics are occurring on other Danish universities. Information was also gathered from the Danish consultancy organization HortiAdvice that is responsible for almost all applied publication/dissemination of knowledge in fruit and berry area. HortiAdvice Scandinavia A/S annually publishes a best practice handbook for fruit and berry production. Best practice here is based to a large degree on information in this handbook and with added knowledge from scientific and popular papers in grower magazines.

Anon. (2016) Håndbog for frugt og bæravlere 2016. HortiAdvice Scandinavia, Hvidkærvej 29, 5250 Odense, DK.

Theme: Water /nutrients

Relevant recent projects at Aarhus University:

Theme: Water /nutrients

Fertigation – A challenge in production of organic foods. Project period: 01.10.2013 – 30.09.2017

Production of organic nitrogen fertilizer with mobile green fertilizer. Project period: 01.01.2012-31.12.2015

DANBAER (DAN-BERRY): Sustainable production of Danish fruit and berries and development of high value products. Project period: 2015 – 2019.

[1] Please see ec.europa.eu/eurostat/ramon/nomenclatures/ for details on NUTS regions, level 3

Best practice findings

Theme: Water /nutrients

For fruit trees drip irrigation every 50 cm in row or at planting position is normally applied the first 3 years after planting, and thereafter normally very limited only in draught situations, but depending on planting system and management. In more intensive productions and using root pruning it is highly advised to have access to irrigation in late spring to ensure optimal fruit size and avoid June drop, and regulate irrigation in the season to improve yield but reduce vegetative growth. In intensive apple, pear and stone fruit drip irrigation is very common. In strawberries irrigation is necessary in harvest years, both before and after flowering and in autumn to ensure flower bud development. Sieve tubes may be buried 10-15 cm into the ground in strawberry beds. In highbush blueberries irrigation capacity during summer is critical due to shallow rooting. Tensiometers, Watermarks and water deficit based on evaporation data may be used for control and timing of irrigation. Industry fruits (black and red currant, sour cherry) are traditionally not irrigated but precocity and yield will increase following irrigation.

Fertilization

The Danish law set maximum fertilizer application to 140 kg N /h for apple and pear, 150 kg N /ha for sweet, sour cherry and plums (without grass) and 200 kg N/ha with grass under cover. For black and red currants 160 kg N/ha is the limit. 100 kg N /ha is the limit for gooseberries, raspberry, blackberry, rose hips and 160 kg N/ha for blueberries and 80 kg/ ha for strawberries outside. Typically most tree fruit is fertilized less than the norm to control vegetative growth. Addition of fertilizer is typically split equally into three times, March-April, end of May/June and end of August/start September, the latter one depending on the yield and removal of fruit from the area. The soil type also affects the amount of fertilizer given. Evaluation of nutrient status is done by leaf samples taken in July to adjust within the same year, and in August-mid September to adjust for the following year. Reference values of most important nutrients in leaves are available for comparison in major crops. Fertigation is increasingly used as a method to optimize fertilizer access during a season and in the entire rootzone. A large amount of standard fertigation solutions are available and can be adapted to individual crops depending on demand. Leaf fertilization may be used to correct minor unbalances during the season. Especially urea (N) may be applied before flowering and after fruit harvest if low N levels are found. Phosfor (P) sprayed on apple 1.5 months before harvest may improve red color on apple. In addition spraying with K, Mg, Ca, Bor, Iron and MN may be of benefit. A large number of specially adapted leaf fertilizers are available. Avoid content of phosfites in leaf fertilizers, since this may be confused with pesticide residues.