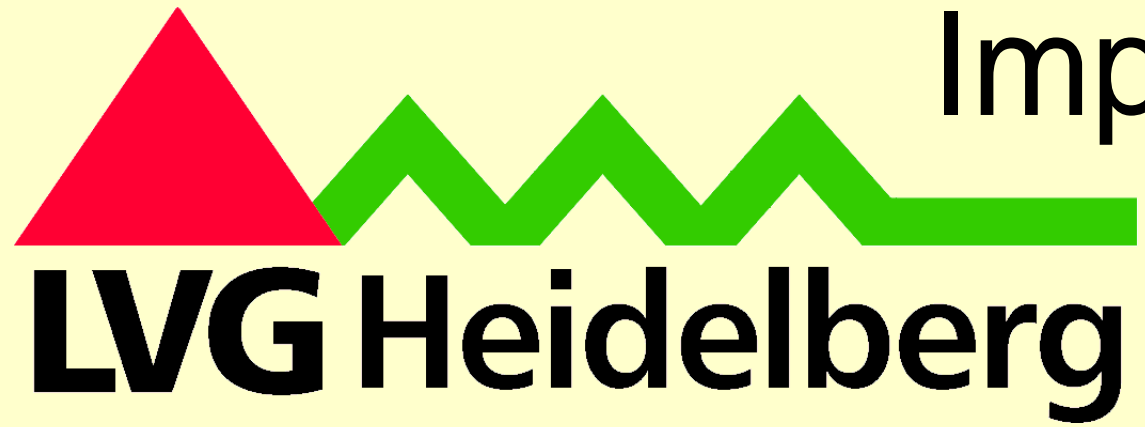


Sustainable improvement of nitrogen efficiency in vegetable crops

Implementation of the EU Water Framework Directive in Baden-Württemberg, Germany

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Water Framework Directive – a challenge for vegetable crop production

- The Water Framework Directive (WFD, 2000/60/EC) requires a 'good quantitative and chemical status' for all water bodies by 2015.
- In the state Baden-Württemberg (Germany) 14 out of 23 groundwater bodies are characterised as being 'at risk' and will not reach this goal.
- Agricultural and horticulture land use was designated for being the main contributor to nitrate leaching to groundwater.
- The national and state action plans *DüV*, *MEKA* and *SchALVO*⁽¹⁾ are accepted as standard measures in groundwater bodies to comply with standards of the WFD. But in groundwater bodies at risk additional measures are required to enhance water quality.
- The State Horticultural College and Research Institute (LVG), Heidelberg, established an advisory project to improve nitrogen efficiency in vegetable crops in three groundwater bodies at risk. Opening of the three year project was 2011. It is funded by the Ministry of Rural Affairs and Consumer Protection of Baden-Württemberg.

Objectives of the project

- Improving nitrogen (N) efficiency in field grown vegetables in the groundwater bodies at risk by voluntary measures.
- Active participation of farmers affected by WFD to identify the most effective and accepted measures.
- Advice of farmers to implement current and new tools to improve N efficiency in practice.
- Publishing a nitrogen management guide.

Tab.1 Strategies to improve N efficiency in vegetable crops

<p><i>Working group</i> 28 actively engaged farmers</p>	<ul style="list-style-type: none"> • Assessment of current production systems: crop rotation, fertilization, tillage, soil covering. • Inventory of potential measures. • Evaluation of impact. • Assessment and evaluation of nitrogen balances (farm based and site specific).
<p><i>Three pilot farms</i> 5 ha, 10 ha and 400 ha soil characteristics: sL, IS</p>	<ul style="list-style-type: none"> • Field trials with selected measures to improve N efficiency in vegetable crops: <ul style="list-style-type: none"> - use of modern N fertilizer recommendation systems, - management of crop residues to improve N transfer, to succeeding crops in the rotation, - changes in crop rotation, - integration of cover/catch crops in crop rotation.
<p><i>Nitrogen management guide</i></p>	<ul style="list-style-type: none"> • Economical and ecological evaluation of measures. • Evaluation of an integrated and sustainable N management system for vegetable crop production. • Implementation of results in an advisory guide for transfer to other vegetable growing sites in Baden-Württemberg.



○ location of the project in selected groundwater bodies at risk

With active cooperation of farmers, horticultural extension services and administration, a sustainable N management system will be developed and integrates several measures into the farms' crop rotation (Tab.1).

(1) DüV: Düngeverordnung (german ordinance of fertilizers), MEKA: Marktentlastungs- und Kulturlandschaftsausgleich (national agri-environmental programme), SchALVO: Schutzgebiets- und Ausgleichsverordnung (national decree in water protection areas)



Project Partners:

- Regional Council Karlsruhe, Department 33
- Official extension services for water protection and vegetable crops of the District Offices Karlsruhe and Rhein-Neckar-Kreis
- Nitratlabor Heidelberg
- Vegetable growers in the groundwater bodies at risk Rhein-Neckar, Hockenheim-Walldorf and Bruchsal



Baden-Württemberg

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