



Commercial Vegetable Growing Nitrogen Risk Scorecard

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1. Nitrogen Fertiliser Practices

- (a) Nitrogen fertiliser annual application rate
- (b) Nitrogen fertiliser application rate per application (individual)
- (c) Nitrogen balance/budget
- (d) Nitrogen soil testing
- (e) Crop establishment fertiliser application method
- (f) Side fertiliser application method



2. Soil Health

- (a) Practices between crops
- (b) Catch crops (cut-and-carry)



1. Nitrogen Fertiliser Practices

(a) Nitrogen fertiliser annual application rate	Points	Proportion of area (%)
N fertiliser: <100 kgN/ha	0	
N fertiliser: 100-150 kgN/ha	30	
N fertiliser: 151-200 kgN/ha	60	
N fertiliser: 201-250 kgN/ha	90	
N fertiliser: 251-300 kgN/ha	150	
N fertiliser: 301-400 kgN/ha	200	
N fertiliser: >400 kgN/ha	250	
Subtotal (column 2 x 3)		

(b) Nitrogen fertiliser application rate per application (individual)	Points	Proportion of area (%)
N fertiliser: <25 kgN/ha	-30	
N fertiliser: 25-50 kgN/ha	0	
N fertiliser: 51-75 kgN/ha	30	
N fertiliser: 76-100 kgN/ha	60	
N fertiliser: >100 kgN/ha	90	
Subtotal (column 2 x 3)		

(c) Nitrogen balance/budget	Points	Proportion of area (%)
Yes	-50	
No	0	
Subtotal (column 2 x 3)		

(d) Nitrogen soil testing	Points	Proportion of area (%)
Before every nitrogen fertiliser application	-50	
At the beginning of each crop within the crop rotation	-30	
One a year	0	
Never	50	
Subtotal (column 2 x 3)		

(e) Crop establishment fertiliser application method	Points	Proportion of area (%)
Incorporated, GPS banded, controlled application	-20	
Surface, GPS banded, controlled application	-15	
Incorporated, banded	-10	
Surface, banded	-5	
Surface broadcast, incorporated	10	
Surface broadcast	20	
Subtotal (column 2 x 3)		

(f) Side fertiliser application method	Points	Proportion of area (%)
GPS banded, controlled application	-15	
Banded	-5	
Broadcast	20	
Subtotal (column 2 x 3)		

TOTAL POINTS. Nitrogen Fertiliser Practices



1. Soil Health

(a) Practices between vegetable crops within the crop rotation	Points	Proportion of area (%) ¹
Cover crop	-30	
Fallow < 4 weeks	0	
Fallow 4 - 12 weeks	25	
Fallow > 12 weeks	50	
Subtotal (column 2 x 3)		

(b) Catch crops (cut-and-carry)	Points	Proportion of area (%) ¹
Yes	-20	
No	0	
Subtotal (column 2 x 3)		

TOTAL POINTS. Soil Health

TOTAL POINTS. Nitrogen Fertiliser Practices + Soil Health

Nitrogen Loss Risk for Commercial Vegetable Growing. Target scores are based on combinations of soil profile water and rainfall classes. Achieving the target score is determined by the combined points for the two practice categories - Nitrogen Fertiliser and Soil Health.

Rainfall classes (mm/yr)	Profile Available Water (mm)		
	151 - 350 mm	61 - 150 mm	0 - 60 mm
Rainfall 1 <1000 mm/year	72	72	52
Rainfall 2 1000 - 1300 mm/year	72	60	48
Rainfall 3 1300 - 1600 mm/year	60	52	44
Rainfall 4 >1600 mm/year	60	48	44

1. Note the sum of the area for fallow periods will equal 100%, plus the area planted in cover crops, i.e., if cover crops are planted the sum of the area is greater than 100%.

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Calculation of Subtotal. The subtotals for each practice category are calculated by multiplying the practice score (column 2) by the proportion of the area that the practice applies to (column 3). The points are then summed. For example, if 50% of the area has a nitrogen soil test at the beginning of each crop cycle and 50% of the area is tested once a year, the subtotal is $(-30 \times 0.5) + (0 \times 0.5) = -15$.

(d) Nitrogen soil testing	Points	Proportion of area (%) ¹
Before every nitrogen fertiliser application	-50	
At the beginning of each crop cycle	-30	50%
One a year	0	50%
Never	50	
Subtotal (column 2 x 3)	-15	

Definitions for NRAT

Proportion of area (%): The proportion of the area that a practice is applied to. This will always total 100%, except for the Soil Health question (1) Practices between crops, where the sum of the fallow periods will equal 100% plus the proportion of the area that are planted in cover crops.

Risk Rating: The subtotals are summed to determine the overall Risk Rating for both of the farm management practices; (1) Nitrogen fertiliser practice and (2) Soil health.

Productive Area: The area denominator in 1(a) and 1(b) is an operation's total productive crop rotation area. This includes both owned and leased land.

Productive area is all the area within the boundaries of the productive crop rotation area. This includes the total area where the crop is grown, including wheel tracks and beds that are not cropped, as well as headlands and races. Productive area does not include the land occupied by buildings. Productive crop rotation area does not include areas that cannot be cropped such as bush blocks, nor does it include pasture grown for greater than 2 years.

Commercial vegetable growing: means the commercial growing of vegetables intended for human consumption, and other crops as part of crop rotation practices.

Crop Rotation: The practice of the systematic planting of different vegetable and arable crops in sequence, or in combination, over multiple years within the same property, and/or on changing properties across sufficient suitable land, which can and often does include pasture phases and fallow periods. The purpose of this practice is to help reduce soil erosion, maintain soil structure and nutrients in the soil, reduce plant diseases and pests, and improve biodiversity. The practice is critical to the maintenance of productive vegetable yields.

Nitrogen fertiliser annual application rate 1(a): This is the total quantity of elemental nitrogen fertiliser applied per year divided by the productive area. This should be split into the different rate bands based on the proportion of productive area (i.e., 50% at 100 – 150 kgN/ha and 50% at 151 – 200 kgN/ha). This is not a whole operation average.

Nitrogen fertiliser application rate per application (individual) 1(b): This is the amount of elemental nitrogen applied per hectare for a single application. This should be split into the different rate bands based on the proportion of productive area where rates vary between crops. This is not a whole operation average.

Catch crop: A catch crop is any crop that is grown with the primary objective of catching excess nitrogen in soils that otherwise may be lost to the environment. At harvest this crop is exported off farm. Examples include maize and grass grown for silage or hay.

Cover crop: A cover crop is any crop that is grown with the primary objective of catching excess nitrogen in soils that otherwise may be lost to the environment. Before the planting of the next vegetable crop the cover crop is mulched and/ or incorporated into the soil.

Fallow: A period of time after crop harvest where the soil remains bare.

Nitrogen soil testing (mineral N): the use of soil mineral N testing. E.g., Quick N test or laboratory based mineral N.

Nitrogen balance/budget: A decision support tool to help a grower understand the inputs and outputs of nitrogen for a crop growing system. Nitrogen outputs are balanced against nitrogen inputs in a graph or table, categorised by source or destination. Nitrogen budgets assist growers with appropriate nitrogen fertiliser recommendations.

Crop establishment fertiliser application methods:

Surface: the application of fertiliser which remains on top of the soil, either banded or broadcast.

Incorporated: the fertiliser is applied into the soil at the time of application.

GPS banded: the placement of fertiliser in continuous narrow ribbons, usually at specific distances from the seeds or plants, recorded using GPS.

Banded: the placement of fertiliser in continuous narrow ribbons, usually at specific distances from the seeds or plants.

Broadcast: The spreading of fertiliser evenly over a large area. The fertiliser then remains on the soil surface to break down.

Controlled application: Controlled application rate of fertiliser is a method of applying fertiliser in a precise and targeted manner using an electronic rate controller that, maintains or adjusts rates during spreading irrespective of speed.