



Technical Update 29

Notes on growing green beans

January 2023

Whilst most green beans are still grown for processing, a significant proportion is grown for the fresh market. PGRO research has resulted in considerable advances and is the basis for recommendations in this Technical Update. PGRO also provides an advisory service for enquiries during the growing season.

Generally, green beans are best suited to areas south of Peterborough. Further north, shelter, a southerly aspect and a fertile, moisture retentive soil are important factors.

VARIETIES

Over 500 varieties of green beans have been evaluated in trials carried out at PGRO. The choice of variety is a most important factor, influencing yield, quality of the produce and efficiency of mechanical harvesting.

SEED

Green bean seed is particularly fragile, having a seed coat which is easily cracked, and a very small area of attachment between the embryo and the cotyledon. Rough handling, such as the dropping of bags onto a hard surface, will result in a lower percentage of viable seeds. **Handle bean seed with care.**

SOWING

Green beans are sensitive to soil conditions. Ideally, they should be grown in loamy soils of good texture. Over-consolidation and capping must be avoided.

Sowing usually begins around the middle of May and to achieve the necessary length of harvesting season, can extend to the end of June. Consequently, every effort should be made to conserve seedbed moisture and a "stale seedbed" technique is sometimes useful. The soil surface must also be left as level as possible to facilitate efficient harvesting.

The seed should be sown shallowly about 2.5 to 4 cm deep, into moist soil and be covered by about 2.5 cm of settled soil. Sowing too deep is detrimental particularly in the case of small-seeded varieties.

ROW WIDTH AND PLANT POPULATION

In commercial UK crops, row width for green bean production is about 30 cm and many crops are sown in 40 cm rows.

The optimum plant density for green beans sown in wide rows is 35-40 plants/m², giving intra-row spacing of 7 cm and 6 cm respectively. Smaller seeded varieties, which usually have smaller, less vigorous plants than large-seeded types, may also benefit from a slightly higher plant density.

The seed rate required to achieve the desired population can be calculated using information on seed size (thousand grain weight), percentage germination and likely seedbed losses (usually estimated as 10%) as follows:

Seed rate kg/ha =

$$\frac{\text{TGW} \times \text{target population pl/m}^2}{\% \text{ germination}} \times \frac{100}{100 - \text{field loss}}$$

However, most bean seed is now sold by number of seeds required per hectare and belt feed or pneumatic precision drills are usually used to avoid damage or waste of expensive seed.

MANURING

Green beans respond very well to nitrogen. The *Rhizobium* bacteria which nodulate and fix nitrogen for the green bean crop are absent from most UK soils, therefore application of nitrogen fertiliser is needed.

The following table gives recommendations (AHDB Nutrient Management Guide RB209).

	Index SNS, P or K index						
	0	1	2	3	4	5	6
Nitrogen (N) all soil types [kg/ha]	180	150	120	80	30	0*	0*
Phosphate (P₂O₃) [kg/ha]	200	150	100	50	0	0	0
Potash (K₂O) [kg/ha]	200	150	100(2-) 50 (2+)	0	0	0	0
Magnesium (MgO) [kg/ha]	100	50	0	0	0	0	0

*= a small amount of nitrogen may be needed if soil nitrogen levels are low in the 0 - 30 cm of soil. Deduct nutrients applied as organic manures

Apply no more than 100 kg N/ha at sowing or planting. The remainder should be applied when the crop is fully established.

Experimental work with anhydrous ammonia injected into the seedbed prior to sowing the crop, has indicated that there is a danger of damaging the emerging seedlings if it is applied immediately before drilling takes place. When applied at least a week before sowing the crop, similar results have been obtained to those obtained from normal granular nitrogenous fertilisers. Due to the slower release, early application may be more important than with granular fertilisers.

INOCULATION WITH RHIZOBIUM

Inoculants are available for application with green bean seed and have been used in some commercial crops. Resulting yields are similar to crops treated with nitrogen fertiliser and there are environmental and cost benefits.

WEED CONTROL

Green beans offer poor competition to weeds, which must be controlled to ensure maximum yields and ease of harvesting. Inter-row cultivation leaves weeds within the row and the disturbance of the soil causes moisture loss and problems with machine harvesting.

There is a limited range of herbicides available for this crop. Pre-emergence use of Dual Gold (S-metolachlor), pendimethalin products (Stomp Aqua and others) and clomazone (Gamit, Cleancrop Covert), is permitted via EAMU's and can provide useful pre-emergence weed control. Be aware Dual Gold cannot be applied after May 31st. Post-emergence herbicide bentazone (Basagran SG and Benta 480) is the only post-emergence material available for broad leaved weed control. Where weed problems are severe, an adjuvant oil such as Actipron may be added to some bentazone products, but crop effects may be increased. Please check the label. Wild oats can usually be controlled by cultivation prior to sowing.

Graminicide active materials cycloxdim (Laser) and propaquizafop, (Falcon and others) control annual and perennial grasses but not annual meadow-grass (some suppression with propaquizafop). Centurion Max (clethodim) can control annual meadow-grass and offers improved black-grass activity. A checklist which includes herbicides for green beans is available (Technical Update 25).

IRRIGATION

Irrigation before flowering appears to have little if any effect upon yield, although it usually increases vegetative growth, but irrigation during early pod development can produce considerable increases in yield. Irrigation should not be applied during flowering since incidence of *Botrytis* pod rot is increased where petals stick to the developing pod.

DISEASES

There are several diseases of green beans, which are favoured by wet weather.

The grey-mould fungus (*Botrytis cinerea*) thrives in conditions of high humidity, and is generally attracted by damaged or moribund tissue, such as the ends of pods which touch the soil and become damaged, or flower petals which adhere to pods in damp weather. Effective preventative treatment can be made by treating the crop during flowering with a fungicide and repeating the application seven days later. Cyprodinil + fludioxonil has approval for use in green beans and azoxystrobin is also available. Both can be effective at controlling Botrytis and Sclerotinia.

Sclerotinia (*S. sclerotiorum*) can be a very damaging disease when once established. Plants may be attacked when young, the stems becoming watery and rotten and covered with a mass of white mycelium. Infected plants may then wilt and collapse and hard black sclerotia are formed within the stems. The sclerotia can remain in the soil for several years, until favourable conditions occur which result in the sclerotia producing fruiting bodies which release wind-blown spores to grow again when favourable conditions return.

Rust is sometimes found in late sown crops for fresh market. Some products containing tebuconazole have EAMU's for rust control.

Halo Blight is a seed-borne bacterial disease which occurs occasionally but can be avoided by using healthy seed.

In addition, green beans are subject to several root-rotting organisms which can also attack other leguminous crops, especially peas. It is important therefore to minimise the risk of build-up of these diseases by treating green beans, peas and broad beans etc. as the same crop and allowing a minimum of 4 legume-free crops between them.

Growers are advised to inspect their crops regularly for signs of disease, and where they occur, further assistance should be sought. The identification of disease is particularly important to reduce risk to current and future crops.

PESTS

Silver Y caterpillars are an occasional pest and control is recommended before pod damage is noticed. A monitoring system is available to determine whether silver Y moths are present in crops. Traps are available from Koppert UK, Andermatt UK and Agralan.

Heavy infestations of black bean aphids can cause malformation of pods and stunting of plants, especially if colonies develop on the flower buds. Pirimicarb (Aphox) is approved as an EAMU 2152/18 and Tepeki as EAMU 2697/20. Tepeki is harmful to bees and should not be used during flowering.

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