

microbes means a rapid strong supply of N and other beneficial compounds to crop plants.

A recommended starting point is to apply 50% of the normal rate of N fertiliser, plus TwinN, applied once or twice. Apply the N at the same stages of the crop cycle as usual. Many producers also test, in addition, a greater reduction down to 25% of normal N. Depending on soil fertility and crop needs most systems will produce long-term sustainable high yields at between 25 and 50% of normal N inputs. **Start at 50% and work downwards.**

#### Exceptions:

- Organic producers should apply their normal sources of N, plus TwinN.
  - Low input/low yield crops, such as arid dryland wheat, should apply 20 to 30 units of N plus TwinN applied once at early tillering.
  - Where soil fertility is naturally very high, or when a lot of residual N is present from a previous legume, producers may not need to apply N fertiliser - just use TwinN.
2. **Number of TwinN applications.** If the normal N application is medium to high (> 50 U of N) for annual crops, then apply 2 applications of TwinN, one for early vegetative growth and the second at early flowering to set up yield accumulation. **If you would normally with-hold N at flowering (eg fruit tree crops) then do not apply TwinN at that stage.**
- If the crop normally uses lower rates of N then trial a single application of TwinN versus two applications and let the results and economics guide you on the right number of applications.
3. **Non-N nutrition.** Ensure that non-N nutrients such as **P, K, etc are applied at normal rates.** TwinN will assist in capturing these nutrients more effectively but it cannot supply them.

CONSULT YOUR DISTRIBUTOR FOR ADVICE ON HOW TO INTEGRATE **TwinN** INTO YOUR CROP PRODUCTION SYSTEM. [WWW.MABIOTEC.COM](http://WWW.MABIOTEC.COM) ALSO HAS USEFUL INFORMATION.

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# INSTRUCTIONS FOR USE



## Use 1 Vial for 5 Ha, or 2 Vials for 10 Ha

TwinN is a freeze dried microbial product and these application instructions must be followed to enable the microbes to establish in your crops and soil. Consult your local distributor or visit [www.mabiotec.com](http://www.mabiotec.com) for further information. **Here are three key rules to follow:**

1. **Water quality is important.** Rehydrate the microbes in clean rainwater or tap water. After that, mix the microbes into any source of clean, non-chlorinated water. **If you expose the microbes to chlorinated water it will kill them.** See de-chlorination notes below.
2. **Avoid desiccation (drying out) of TwinN microbes during application.** Once TwinN microbes are established in the plant or soil they are very tough. If applied as a foliar the microbes must not be allowed to desiccate before they can enter the plant. If applied to the soil, ensure they enter a moist environment. **Avoiding desiccation during application is critical to effective use of TwinN.**
3. **Do not mix TwinN with the wrong chemicals.** TwinN is compatible with many products **but not all.** Do **not** tank mix with glyphosate herbicides. If you want to co-apply TwinN and other products in the same water, consult [www.mabiotec.com](http://www.mabiotec.com) or your distributor for a list of products that are compatible. **If in doubt do not co-apply agro-chemicals in the same water, as some kill TwinN microbes.**

## STEPS TO APPLY TwinN TO YOUR CROP

### Step 1 - Rehydration of Freeze Dried Microbes

The TwinN package contains 1 or 2 vials containing freeze dried microbes plus a rehydration container with microbe food. **Use 1 TwinN vial for 5 Ha or 2 vials for 10 Ha.**

1. Fill the rehydration container with 100ml of clean, room temperature water. Rain water or tap water must be used for this step. The microbe food in the rehydration mix will de-chlorinate up to 100 ml of tap water. Mix thoroughly.

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Use this solution to dissolve the freeze dried material from one vial (5 Ha) or 2 vials (10 Ha) by shaking and pouring it back and forth until it is fully dissolved in the 100 ml container. Screw the lid on and shake vigorously for 30 seconds to disperse the microbes.

2. **Allow the solution to stand for a full 4 hours at no hotter than 28°C.** Use immediately or store in the fridge, or on ice, until needed, for **up to 1 month**. Do **not** leave the rehydrated microbes at room temperature after the initial 4 hours - **store them on ice or refrigerate. Do not freeze.** A convenient practice is to rehydrate the microbes for 4 hours the day before use and refrigerate them overnight to enable immediate use the following day.

## Step 2 - Application to the Crop

The 100 ml of rehydration solution will treat 5 or 10 Ha (1 or 2 vials) and the user must calculate how much to add to the mixing tank to treat the required area of crops. Dilute the 100 ml of concentrated rehydration solution into the correct volume of clean **non-chlorinated water** in a mixing tank or equivalent. Application volumes per Ha are described below. Mix thoroughly and apply to the correct area of crop. The application mix must be used within 24 hours after mixing and must remain cool if stored before use. **Use cleaned equipment. Ensure water is free from chlorine and do not mix with incompatible agro-chemicals.**

See de-chlorination procedures below.

### Soil Application

This is a very convenient application method. Apply TwinN to the root zone where it will enter the plant roots and colonise stems and leaves. Use liquid injection, drip irrigation, fertigation or overhead irrigation systems. Ensure that microbes are applied to moist soil in **sufficient volume of water** that they are carried into the root zone where they can commence work. **Ensure water is free from chlorine and do not mix with incompatible agro-chemicals.**

### Foliar Application

Apply TwinN to the crop foliage using a boom spray, aerial application or other system. **Use a coarse nozzle and apply at over 100L per Ha.** There are no upper limits to application volumes. For aerial application apply at 30 L/Ha, ensure nozzles are **not** fine and **apply onto damp foliage.** At 30 L/Ha, **application onto dry foliage will not work.** It is critical to apply the microbes to foliage that will be moist for several hours so **do not apply in the heat of the day.** Preferably apply onto a dew early in the morning or late afternoon or at night. **Do not allow the microbes to dry out before they can enter the crop foliage. This is a key factor in using TwinN effectively.**

## CORRECT APPLICATION IS IMPORTANT TO GETTING SUPERIOR RESULTS FROM TwinN

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## DE-CHLORINATION PROCEDURES

**De-chlorinate water before adding rehydrated microbes to the mixing tanks. Exposure to chlorine kills TwinN microbes immediately.**

### Sodium Thiosulphate

The recommended method for dechlorination is to use sodium thiosulphate (STS). STS is convenient and fast-acting. It is available from suppliers of swimming pool chemicals, or aquarium outlets. Alternatively, **contact your distributor** who will be able to either supply STS or direct you to a supplier.

Add 20g of STS for each 1000L of application water (10 Ha) or 2g per 100L for 1 Ha. Initially, dissolve in 5L of water and then **mix very thoroughly** into the full volume. Wait 5 minutes before adding TwinN.

### Tannic Compounds

For organic producers with no alternative to chlorinated water, use the following method to de-chlorinate water: **Tannic compounds from tea is the recommended method for organic producers.**

Tannic compounds from tea are efficient chlorine neutralizers. For 10 Ha at 100L/Ha application volume (1000L) add 30g tea to 1 L of hot tap water and wait 30 minutes, stirring periodically. Strain to remove tea leaves. Add at a rate of 1 L of tea concentrate per 1000L (10 Ha) or 100 ml per 100L of application water (1 Ha). **Mix very thoroughly and wait 20 min** before adding TwinN microbes. Tea concentrate can be stored for 24 hours at room temperature or 7 days in the fridge.

## AGRONOMIC GUIDELINES

Visit [www.mabiotec.com](http://www.mabiotec.com) for recommended application procedures and timing for specific crops, or consult with your distributor.

### Agronomy Basics

- Apply **normal rates of non-nitrogen fertiliser (P, K etc).**
- Apply TwinN plus **50% of your normal rate of nitrogen at the same times you would normally apply nitrogen.**
- For annual crops apply TwinN early in crop growth and again at start of flowering.
- Use on legumes and non-leguminous crops.

### Agronomy Facts

TwinN microbes work best when crop plants are healthy. The number of TwinN applications and the combinations with different amounts of fertiliser N can be varied to optimize production from your particular system. Here are three key factors to consider:

1. **Nitrogen nutrition.** Supply some nitrogen at planting so the plants are vigorous when TwinN is first applied. This is important because the plants and microbes supply **each other** with beneficial compounds. A good early establishment of

