



## Technical Update 37

### Tenderometer standardisation & maintenance

January 2023

PGRO operates a scheme in conjunction with Campden BRI to ensure that Master machines give accurate results. Checks between the Master tenderometers are undertaken regularly throughout the season using carefully prepared fresh peas of three different maturities. Any members wishing to calibrate their machine to the PGRO Master may take part in the scheme.

In February 2013 PGRO completed an AHDB funded project FV401 titled "Vining peas: development of an improved standardisation procedure for the pea tenderometer" this report has formed the basis of the decision to adopt a Dodman digital tenderometer as the Master reference unit at PGRO.

#### PRE-SEASON TESTS

The instrument can be checked ahead of the pea season using frozen peas that have been defrosted or canned standardisation peas obtainable from Campden BRI. Canned and defrosted peas whilst not providing as consistent results as fresh peas can give an indication of any serious issues with a tenderometer, frozen peas must be defrosted thoroughly.

**Further tests using fresh peas should be made as soon as possible to adjust the tenderometers to finer tolerances.**

#### SEASONAL TESTS

Tests will be carried out by appointment only with Issy Jarvis, between 9.00 am and 4.00 pm. If processors/growers are able, PGRO requests that Tuesday be the primary day for cross checks. **PGRO correspondence should be directed to [issy@pgro.org](mailto:issy@pgro.org)**

#### Sample Preparation

It is important that samples are well prepared to ensure a minimum variation of maturity within the sample. The peas should not suffer unduly from damage. Standardisation peas must be washed and graded by selecting the fraction that will pass through a 9.5 mm sieve but be retained by an 8.0 mm sieve (N.B. sieves must be traceable). Sufficient peas should be prepared to take fifty readings usually about 8kg. Containers should be cooled with cold tap water to ensure that they are of similar internal temperature.

The sample should be immersed in a vessel of ice cooled water. The peas should then be thoroughly mixed and carefully divided into the containers, ensuring that **no free ice** is in the sample and the peas should be covered with water at 1 - 3.5°C. **Do not** add ice packs. A container should then be delivered to the PGRO research station.

#### Test Procedure

On receipt of the sample at Thornhaugh, the sender will be contacted by telephone so that the tests may be synchronised.

Containers should then be opened, their contents thoroughly mixed, and further mixing should be undertaken during the test. The temperature of the peas should be recorded and eleven tenderometer readings taken. The grid must be washed thoroughly after the first six. The tenderometer owner should then contact PGRO to give the mean result from the last ten, the highest and lowest reading and the temperature of the sample.

For the purposes of calibration, an adjustment is made to the mean of the ten readings depending on the temperature of the sample. For every 1°C above 15°C a correction of 0.4 tenderometer units are added to the mean and for every 1°C lower than 15°C then 0.4 tenderometer units are subtracted.

The values for a tenderometer test will be compared with the PGRO Master.

The tolerance limit is  $\pm 3$  tenderometer Units, and the acceptable range is 8 units.

If differences between the tenderometer to be standardised and the PGRO Master exceed this figure or the range is greater than 8 TR units, the PGRO recommend that a further test should be carried out as soon as possible. In some seasons, peas within a sample may show wide variations in maturity and this may affect the test.

If the tolerance limit is still exceeded, recommendations will be given by PGRO for any adjustment needed to bring the tenderometer to within the accepted tolerance range. The decision to make any adjustments rests with the owner of the test tenderometer.

### *Adjustment of the Martin Tenderometer*

To increase TR reading: Raise large weight 2.5 cm to give approximate increase of 3 TR units. Raise small weight 2.5 cm to give approximate increase of 1 TR unit.

To decrease TR reading: Lower large weight 2.5 cm to give approximate decrease of 3 TR unit. Lower small weight 2.5 cm to give approximate decrease of 1 TR unit.

### *Adjustment of the Dodman Tenderometer*

Adjustment of the Dodman "Offset" requires high level user access, please see your supervisor if you do not know what this code is. Once logged on the offset can be adjusted to bring a unit into alignment with the PGRO Master.

After adjustment a further test should be carried out.

If differences between the tenderometer to be standardised and the PGRO Master show a very wide variation, for example  $\pm 10$  TR units, there is likely to be a serious mechanical problem and it is recommended that the test machine is withdrawn from service until the problem can be rectified.

## FREQUENCY OF TESTS

Tests should be carried out at the start of the vining season, and then routine tests can be made each week. More frequent tests should be made if trouble is suspected with a particular tenderometer, or if the factory instrument is used for checking other tenderometers.

## CARE & MAINTENANCE

As befits an instrument which gives values which form the basis of payments which run to approximately £45m p.a., the tenderometer should be used with great care. Stones and other extraneous matter **must** be removed from pea samples before readings are taken, and even soil and grit in the sample can cause rapid wear on the blades. Worn cells usually give a low reading, but there is no consistent pattern over a range of maturity.

## INSTRUCTIONS FOR USE & MAINTENANCE OF THE MARTIN TENDEROMETER

The instrument should be checked to ensure that it is in working order.

### Check List

- a. Is the frame level?
- b. Are blades of the grid-box clean and free to move smoothly?
- c. Is the counterbalance arm free to rotate without fouling on the frame, the damper or the chute?
- d. Is the damper operational?

If the tenderometer is correctly adjusted, the pointer should read 200 when the counterbalance arm is lifted through an angle of 90° to the horizontal position, in addition it is also possible to check at 30° and 45° where the pointer should read 100 and 141.4 respectively.

The tenderometer should be carefully maintained to keep wear down to the minimum and general recommendations are as follows:

### Daily Maintenance

- a. Lubricate front and rear of main shaft bush  
(Micron 100 machine Oil Vega)
- b. Fill oil cups  
(Micron 100 machine Oil Vega)
- c. Grease mainshaft nipples  
(EP Lithium Grade No. 3)
- d. Lubricate upper and lower wormshaft bush  
(Micron 100 machine Oil Vega)
- e. Lubricate latch arm joints  
(Micron 100 machine Oil Vega)
- f. Lubricate universal joints  
(Micron 100 machine Oil Vega)
- g. Lubricate all exposed nut and bolt heads  
(Micron 100 machine Oil Vega)

- h. Top up cylinder oil level (if necessary)  
(Tellus Oil 37)  
(See weekly maintenance)
- i. Fill top cover catch  
(Micron 100 machine Oil Vega)

The lubricants given above can be replaced by other equivalent brands.

### **Weekly Maintenance**

Check damper performance. If the oil and its level are correct then, when using peas, the counterbalance arm should just return to the vertical by the time the trip disengages the drive to the blades. A fast descent at first and then a sudden braking action means that the oil needs topping up. A steady descent at first and then a sudden finish and impact with the shock absorbers means that water has got into the damper and so the oil should be drained off and replaced with Tellus Oil 37. If the descent is very slow (8 or more seconds) then the damper has been filled with too thick oil. The heavy damping will also tend to act during the upward movement of the weight arm and will reduce the average TR readings. The oil should be changed.

## **INSTRUCTIONS FOR USE & MAINTENANCE OF THE DODMAN TENDEROMETER**

Please refer to the instructions provided with your Dodman unit or contact Dodman for support.

### **NOTES**

1. Insulated containers are available from most camping suppliers, hard-ware shops, department stores or Amazon.co.uk
2. Sieves of 8.0 mm and 9.5 mm are available from Farleygreene Ltd of Aldershot, Hampshire, Tel: 01252 322233, email: tim.pearte@farleygreene.com
3. Tenderometer servicing, maintenance and parts: T. Skerritt, Dodman Limited, Hamburg Way, North Lynn Ind. Estate, King's Lynn, Norfolk PE3 2ND, Tel: 01553 774755

### **LIABILITY**

PGRO - Whilst all reasonable care will be taken by PGRO in the testing and calibration of tenderometers, PGRO does not accept liability for the accuracy of such testing, nor for any consequential loss.

Campden BRI - Information emanating from this Research Organisation is given after the exercise of all reasonable care and skills in its compilation, preparation and issue, but is provided without liability in its application and use.

### **ADMINISTRATION**

#### **Charges**

A charge of £143.00 + VAT will be made for each test and owners will be invoiced at the end of the season. A proportion of this fee will be forwarded to the CCFRA to help cover the cost of maintaining their master machine.

#### **Participation**

Those wishing to take advantage of this service under the terms and conditions outlined should complete and return the provided slip.

The information in this publication must not be reproduced without the express written permission from the PGRO.

Information disseminated by the Processors & Growers Research Organisation is given after the exercise of all possible care in compilation, preparation and issue, but is provided without liability in its application or use.

## **Processors & Growers Research Organisation**

The Research Station, Great North Road, Thornhaugh, Cambridgeshire PE8 6HJ, UK  
**Chief Executive:** Roger Vickers **Tel:** +44 (0)1780 782585 **email:** info@pgro.org **www:** pgro.org  
Company Limited by Guarantee - Registered in London No. 567232. Registered Charity No 284077.  
VAT Reg No 281 7742 37GB

**TENDEROMETER STANDARDISATION**

We the undersigned wish to participate in the PGRO Tenderometer Standardisation Service and agree to the terms and conditions given in Technical Update 37, January 2023.

Please supply us with an appropriate email or fax number.

Email: ..... Fax: .....

Please ensure that this is filled in correctly for us to update our mailing/communication list.

Print & Sign Name .....

Company .....

Address .....

Telephone: ..... Date .....