Open-Source
Acid Extraction Protocol for Tomato Seed

V4 1/8/22 by Ben Gabel at Real Seeds

See www.realseeds.co.uk for possible updates

Be careful! Use entirely at your own risk, no liability is accepted for anything resulting from doing this.

Home seed-savers: you do not need to do this.

This is for professional seed producers to process small batches of tomato seed.

Materials:

- 10% Hydrochloric Acid , often sold for cleaning brickwork prior to painting.
- Suitable containers for reaction: Pyrex / plastic bowls or buckets.
- Larger buckets for rinsing
- Hose/tap with cool water (not too cold though to avoid shocking the seeds)
- Large plastic sieve with fine enough mesh to catch tomato seeds
- Riddle with coarse enough holes to pass tomato seeds (1/4 inch ideal)
- Digital scales accurate to 1gram to measure the acid (or Accurate graduated measuring beaker, a kitchen jug is not accurate enough)
- Digital scales suitable to weigh mass of tomato to be treated e.g 2-10kg range
- Disposable cups or pyrex glass for measuring acid
- Stainless or plastic stirrer – fork/gaint spoon or whatever
- Emergency bucket full of cold water (rinse acid splashes off immediately)
- Safety goggles
- Rubber gloves
- Plastic apron

Method:

SEE VIDEO DEMO AT HTTPS://YOUTU.BE/XQ6OXPCAF4Y

(OR SEARCH FOR "REALSEEDS TOMATO SEED ACID EXTRACTION VIDEO")

REACTION

Chop or mash whole tomatoes, or cut in half and squeeze out seeds. Both methods work.

Weigh the mass you are about to add acid to.

Wear gloves, eye protection and plastic apron. Measure out 10% HCL as below by weight - accuracy is important.

Add acid to the mass in the bucket.

Immediately seal HCL container and place safely away, & thoroughly rinse measuring beaker.

Stir tomato-acid mix gently but well with a stainless or wooden implement.

Set a timer. Leave for time specified, stirring gently every 20 minutes.

MASHED/CHOPPED TOMATOES	PULP & SEEDS REMOVED FROM TOMATOES
75g of 10% HCL per Kg fruit	100g of 10% HCL per Kg pulp
90 minutes acid treatment	120 minutes acid treatment
1 hour water soak	1 hour water soak

TIMING

The timings above are usually good. You are trying to soften the gel coat that is on the seeds but not eat through the seed coat itself. The time taken will vary from variety to variety. Have a poke at the seeds with a fork and see how they are. In warmer weather it will react faster.

If you are using mashed tomatoes it will go quicker than if using extracted seeds+gel, as large lumps of tomato have less surface area per kg.

EXTRACTION

After reacting with the acid for the precribed time, gently add water to your tomato-acid mixture, to dilute it at least 5 times by volume. It is now much safer to handle. Now proceed as follows:

MASHED/CHOPPED TOMATOES	PULP & SEEDS REMOVED FROM TOMATOES
Pour the dilute mix through a riddle over a large tub, and blast seed off the tomato chunks into the container below with a stream of water from the tap. Rotate the riddle and rub gently with (gloved) hands under the stream of water from the tap until no seeds are left on the riddle, which should now contain only chunks of tomato. Discard the contents of the riddle, you only need the seedy water in the tub now.	
If many seeds in the tub are still floating & attached to placental material, pour the whole lot into a seive, and rub it **gently** with the back of your hand under a stream of water. The motion is the same as rubbing flour when baking. This gently abrades the seed off the goo. Everything will stay in the seive but that is fine.	Pour the whole lot into a seive, and rub it **gently** with the back of your hand under a stream of water. The motion is the same as rubbing flour when baking. This gently abrades the seed off the goo. Everything will stay in the seive but that is fine.

FRACTIONATION

Put the tomato-seed-acid-goo in a large/tall container, with room to add water & mix around.
Add large amounts of cool water, avoiding splashing, and mix well - seeds should fall to the bottom and easily come clean.
(If many seeds are still floating & attached to plant material, put it all back in the seive and rub around (gently!!) again under the tap. Then try again.)
As the seeds start to settle, gently pour off top ½ of liquid and bits of tomato. Discard.
Add large amounts of cool water again, and stir well.
Protective equipment no longer needed now.
Repeat until only seeds remain.

NEUTRALISATION

Acid will be absorbed into the seed coat and needs to be soaked out otherwise it will interfere with germination and seedling growth:
Decant seeds into sieve from the large tub.
Rinse your large tub, put the seeds back into it, and top up with a large quantity of cool (not cold) water.
Set a timer. Leave for a minimum of 45 minutes, ideally 60.

PLATING OUT

Decant seeds into sieve from the large tub again. Pat repeatedly on the bottom of the seive with your hand to remove as much water as possible, this can take easily a minute. Do not squeeze the seeds as they are soft and fragile at this stage.
Turn out onto plastic chopping board and use sieve to spread out into a 1-seed layer.
Blot through sieve using towel to remove as much water as possible.
LABEL carefully including weight of fruit, weight of pulp, weight of acid, treatment time and soak time.
Place in cool draughty place to dry.

CLEANUP

Wipe down everywhere with a damp cloth, repeatedly, with much rinsing, to avoid transfer of any acid drips that may have escaped. When diluted enough the acid is harmless.

NOTES:

- This protocol is a suggestion only. If you do this it is your decision and at your own risk. Make sure you understand what you are doing and if you have any doubts as to your ability to do this safely, DO NOT PROCEED.
- If you use different acid strength, both the time and quantity will vary. E.g. using 5% HCL you need to double the amount per kg AND double the time.
- DO NOT USE CONCENTRATED HCL! Concentrated or industrial HCL is about 30-35% and can cause life-changing injuries in a couple of seconds. I have used the weaker acid, which while is only 1/3 the concentration has a far lower reactivity and is safer to use. If you splash 10% HCL on your skin rinse off immediately with copious water but it is not going to burn through to the bone the way the other stuff can. The real danger is to your eyes.
- I have experimented with 60 minutes and 90 minutes. Both had no effect on germination compared to controls, but the 60 minute treatment did not affect the hairs on the seeds. 90 minutes removed them a bit.
- There is talk of using organic cider vinegar as a Biodynamic method. Unfortnately if my maths is right the chemistry is such that it is about 85 times less reactive than HCL so would need approx. 6L vinegar /kg tomato and 4 days soaking to have the same effect.
- I have also experimented with 5% acetic acid as a treatment of already-dried seed, for treating old stock against virus. I am quite sceptical of this as the only mention online is for one particular pathogen, not sterilisation in general, and wonder if this has by chinese whispers been turned over time into a suggestion for all seedborne diseases. However I can confirm that for dried seed, up to 20 minutes soak in 5% Acetic acid causes no loss of germination.
- Likewise I have experimented with up to 6 minutes of 10% HCL on already-dried seed and saw no loss of germination. There was no damage to the hairs either, so longer treatment is probably safe, and further experiments would be useful. I do believe this will have destroyed any virus on the seeds.

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