



Low-pressure superheated steam is used wherever steam is required to act as a thermal agent.

Thanks to its high temperature (180° C.), **superheated steam** can be conveyed over considerable distances.

For this reason, **low pressure steam-generators** are used increasingly to replace medium-pressure and high pressure boilers.

They offer two important advantages :

- 1) Superheated steam is 40 to 60 % cheaper than high-pressure steam
- 2) **low pressure generators** are not subject to periodical checks by State Inspection Authorities.

Some areas of application :

Agriculture :	Weeding - Soil sweetening - Disinfection of soils and crops - Disinfection of moulds and composts.
Construction :	Heating of aggregates - Hot concrete making - Steam curing of prefabricated elements.
Mineral-oil :	Gas freeing of mineral-oil tanks Recovery of residues by heat.
Food-industry :	Production of composite feeds (granules) Pasteurization of fruit juice. Sterilization of equipment and piping. Bakery industry.
Ets ...	Dry cleaning - Heating of swimming-pools - timber drying

The **steam generators** of our **standard** series are equipped with burners using domestic fuel-oil. However, all our generators can also be fitted with gas-burners.

SIMOX steam-generators are being operated in over 40 countries.

SIMOX ... The specialist for the treatment of soil with vapour.

The ECOLOGICAL WAY of disinfecting soil, used for intensive cultivation.

- DISINFECTION with vapour is always effective.
- One does not have to wait days or weeks before cultivating the soil.
- There are no toxic residues in the soil or in the crops harvested.
- One can remove 100 % of weeds, where one wants and when one wants.
- An effective remedy to many different diseases.
- Your investment is paid off simply by an end to weeding costs.
- You choose **QUALITY** as an argument for your produce in the competitive single European market.

VAPOUR : IT'S NOT MORE EXPENSIVE !

IT'S JUST SO MUCH MORE EFFECTIVE !

11 Disinfection models from 50 kg/vapour/hour to 1 400 kg/vapour/hour.
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DISINFECTION and STEAM TREATMENT of SOILS and COMPOST

with " SIMOX " STEAM-GENERATORS

100 % WEEDING

Steam injected and maintained in the ground at a temperature of about 190° F., burns out the roots and seeds of all weeds and therefore avoids weeding, a costly operation which has to be repeated frequently because it is inefficient and difficult to carry out, owing to lack of labour.

Complete destruction of insects, larvae and especially pathogenic germs of cryptogamic diseases which spread with an ever-increasing speed and virulence, from year to year, to become the fiercest enemy of intensive cultivation, owing to the inadequacy and sometimes the impotence of anticryptogamic chemicals.

Considerable increase in the functional balance, the vigour and strength of plants.

Whatever the type of soil, steam greatly promotes :

- the action of useful bacteria in the disinfected ground layer
- the development and assimilation by plants of the vital fertilizing elements.

Speeding up of germination

The thermal effects of the treatment also speed up germination and growth (2 weeks advance over cultivation on non-treated soils).

The resulting benefits on plant balance and health : a much more developed root system (commonly twice the normal size), highly vigorous germination, higher chlorophyll content.

For all users, steam soil disinfection means :

- crops become saleable very much earlier than usual ;
- considerable increase in both the quality and quantity of the crops.



DISINFECTION and STEAM-TREATMENT of SOILS and COMPOSTS

We should like to thank you for the interest which you are showing in our equipment and, more specially, in our soil disinfecting system, which is in widespread use in many countries and which, in our opinion, is still capable of considerable development during the years to come. The reasons for this will become evident later on.

Before tackling the study of steam soil disinfecting, and in anticipation of the commercial contacts which we should like to develop with your Company, we feel we ought to give you some details about our Firm.

It was constituted in 1952, and specialized immediately in the manufacture of the steam generators use for disinfecting purposes.

Its Chairman is Bernard SYLVESTRE-BARON.

Most of our activities over the past quarter-century have been directed towards the problem we are discussing to-day. The result so far is to have nearly ten thousand machines operating in thirty countries. We can therefore say with justification that the steam disinfecting of soils has proved itself widely, quite simply because it provides a solution to the serious pollution problems existing wherever crops are grown intensively.

The DISINFECTION of SOILS by STEAM

We shall now try to give you as much information as possible on the method which has attracted your interest.

This method of disinfecting soil, I.E. by steam, was already in use in 1940 in the United States, the Netherlands and Switzerland. Our firm put its first machines on the market in 1950. It was from this time that, at first in France, and then in many other countries into which we introduced it, the method has come into increasingly extensive use.

The PRINCIPLE of STEAM DISINFECTION of SOIL

The basic idea is to take the soil to a high enough temperature to destroy as many parasites as possible, while sparing useful micro-organisms.

A low-pressure boiler generates superheated steam (160 to 185° C.). This steam is channeled into rubber pipes and thus taken to metallic frames or under plastic sheets which are placed on the soil after it has been ploughed and harrowed.

The time during which the steam is injected into the soil depends firstly on temperature at which the soil is to be disinfected and secondly on the desired disinfecting depth.

DISINFECTION UNDER METALLIC FRAMES

Metallic frames are used, either in greenhouses or in the field, for surface disinfecting (maximum depth : 20 cm), which is sufficient for many market-garden crops.

Each of our generators has a frame area designed for its power. The time needed for disinfecting at 90° C., and a depth of 10 cm, is of the order of 5 to 6 minutes (depending on the outside temperature and the manner of soil preparation). For 20 cm, it takes 15 minutes.

The frames are made of on-rusting aluminium and fitted with special handling eyes or levers.

DISINFECTION UNDER PLASTIC SHEET

These sheets are used whenever disinfecting in depth (over 20 cm) is required, e.g. for the raising of cucumbers, tomatoes or carnations.

Quite evidently, the time during which the steam is applied beneath the sheet will depend on the desired depth of penetration.

Example : Take our AGRIVAP 2014 machine, with a power of 1 400 kg/steam/hour.

This machine may be fitted with a maximum sheet area of 300 m².

The time needed for disinfecting at 90° C. to a depth of :

- 30 cm is of the order of 4 1/2 hours
- 40 cm is of the order of 6 hours
- 50 cm is of the order of 7 1/2 hours
- 60 cm is of the order of 9 hours.

MAIN ADVANTAGES OF STEAM SOIL DISINFECTING

1 - Total weeding : The superheated steam injected into the soil scalds the roots and seeds of weeds and obviates the need for manual or chemical weeding.

2 - Destruction of insects, larvae and especially the pathogenic germs of cryptogamic diseases.

The action of the heat liberated by the steam is highly versatile, unlike that of certain chemicals, which are very selective.

3 - Action of the heat on horticultural soils : soils undergo changes when subjected to temperature of between 50 and 100° C.

- The organic matter is more easily affected by bacteria, so that the fertilizing components are rendered soluble. The quantity of nitrogen, phosphorus, and potash available for the plants increases. A steam-disinfected soil is therefore richer in assimilable elements than the same soil not subjected to heat.
- The heat also acts on the living creatures in the soil. All bacterial activity is destroyed at 127° C., but the steam temperature does not exceed 90° C.. At this temperature, only certain groups of micro-organisms are destroyed, those which endangered the crops.

4 - Effects on germination :

The thermal effects of the treatment are reflected in a increased rate of vegetation and plant growth. At least a fortnight's progress is gained over crops in intreated soils.

PRECAUTIONS TO BE TAKEN

- ❖ Never disinfect at a temperature above 95° C., so as not to endanger part of the useful bacterial activity in the soil. Use the thermometer which is furnished.
- ❖ Follow up disinfecting in depth by copious watering to remove any excess of nitrites.

MAIN FEATURES OF " SIMOX " STEAM-GENERATORS

- These generators are made of selected boiler-steels.
- They are easy to dismantle, maintain and handle. Their sturdiness and simplicity make them easy to operate by unskilled staff.
- They are absolutely safe : they are low-pressure machines (0,5 bar) tested at 2 bars in our plant.
- These generators are of advanced design : naturally, in view of our 58 years experience in this special field.
- They are indubitably profitable :
 - giving a considerable saving in time because they remove the need of weeding
 - they consume a minimum quantity of fuel-oil
 - cost little to maintain, while the cost of disinfecting is lower than that of many chemicals.

WE DRAW YOUR ATTENTION ON THE FOLLOWING POINTS

1 - Water-feeding of the generator :

As our generators work at a low pressure, the water is generally supplied by tapping the town-Main. The water pressure must be situated between 2 and 7 bars. When the water has not enough pressure, it is possible to use a centrifugal electro-pump. Its characteristics will be as follow :
Pressure : 2 to 7 bars - Output : 4 times the steam-flow of the generator, according to the feeding cycle.

2- Electrical equipment :

- The generators : AGRIVAP " 2000 CE " - AGRIVAP " 2001 CE " - AGRIVAP " 2002 CE 18 " - AGRIVAP " 2002 CE 22 " and AGRIVAP " 2004 CE " are delivered : MONOPHASED 220/230 V. - 50/60 Hz.
- The generators : AGRIVAP " 2005 CE " - AGRIVAP " 2006 CE " - AGRIVAP " 2008 CE " - AGRIVAP " 2010 CE " - AGRIVAP " 2012 CE " and AGRIVAP " 2014 CE " are delivered : TRIPHAZED 220/380 V. - 50/60 Hz.
- It is possible to use our steam generators outside electrified areas, by using a generating-set.

3 - Our machines are provided with burners that use fuel-oil, which is a fuel having the same viscosity as that one used in Diesel vehicles (1,80° Engler at 20° C.).

BECAUSE IT IS A HEALTH AND NATURAL METHOD WHICH LEAVES NO TOXIC RESIDUE IN THE GROUND AND IN CROPS, STEAM SOIL DISINFECTION TRULY DESERVES ITS PLACE IN THE STRUGGLE AGAINST POLLUTION AND TOWARDS A BETTER BIOLOGICAL BALANCE

Average area treated with cloche-cover to a depth of 10 to 12 cm

AGRIVAP " 2000 CE "	8 à 15 m2. / hour
AGRIVAP " 2001 CE "	16 à 22 m2. / hour
AGRIVAP " 2002 CE 18 "	35 à 40 m2. / hour
AGRIVAP " 2002 CE 22 "	40 à 50 m2. / hour
AGRIVAP " 2004 CE "	70 à 80 m2. / hour
AGRIVAP " 2005 CE "	90 à 100 m2. / hour
AGRIVAP " 2006 CE "	110 à 130 m2. / hour
AGRIVAP " 2008 CE "	150 à 180 m2. / hour
AGRIVAP " 2010 CE "	200 à 230 m2. / hour
AGRIVAP " 2012 CE "	250 à 300 m2. / hour
AGRIVAP " 2014 CE "	300 à 350 m2. / hour

Advised area for cloche cover by type of " SIMOX " Steam-generators

Model of steam-generator	Cloche-cover area with 50 kg/steam/hr. by m2	<i>Cloche-cover area with 45 kg/steam/hr. by m2</i>
AGRIVAP 2000 CE	1 m2	1,33 m2
AGRIVAP 2001 CE	2 m2	2,22 m2
AGRIVAP 2002 CE 18	4 m2	4,44 m2
AGRIVAP 2002 CE 22	5 m2	5,55 m2
AGRIVAP 2004 CE	8 m2	8,88 m2
AGRIVAP 2005 CE	10 m2	11,11 m2
AGRIVAP 2006 CE	12 m2	13,33 m2
AGRIVAP 2008 CE	16 m2	17,77 m2
AGRIVAP 2010 CE	20 m2	22,20 m2
AGRIVAP 2012 CE	25 m2	27,78 m2
AGRIVAP 2014 CE	28 m2	31,11 m2

The area of the cloche-cover directly depends of the power of the steam-generator.
The best results are obtained with a **charge of steam of**

50 kg / steam/hour by m2

Because our generators are all equipped with an **overheater**, allowing the production of dry steam at a temperature of 170 - 185° C., it may be possible to work with :

45 kg / steam/hour by m2

But, by working in these conditions, the cloche-covers have to remain a little longer on the soil.

Steam-production of " SIMOX " generators

AGRIVAP 2000 CE 60 kg/steam/hr.	AGRIVAP 2005 CE ... 500 kg/steam/hr.
AGRIVAP 2001 CE 100 kg/steam/hr;	AGRIVAP 2006 CE ... 600 kg/steam/hr.
AGRIVAP 2002 CE 18 : 200 kg/steam/hr.	AGRIVAP 2008 CE ... 800 kg/steam/hr.
AGRIVAP 2002 CE 22 : 250 kg/steam/hr.	AGRIVAP 2010 CE ... 1 000 kg/steam/hr.
AGRIVAP 2004 CE 400 kg/steam/hr.	AGRIVAP 2012 CE ... 1 250 kg/steam/hr.
	AGRIVAP 2014 CE ... 1 400 kg/steam/hr.

WEEDING and SOILS DISINFECTION UNDER PLASTIC SHEETS

Model of Generator	AGRIVAP 2004 CE	AGRIVAP 2006 CE	AGRIVAP 2008 CE		AGRIVAP 2014 CE	
Steam-production	400 kg/hr	600 kg/hr	800 kg/hr		1 400 kg/hr	
PLASTIC -SHEETS						
- Number :	1	1	1	2	2	4
- Sizes :	25 m x 3 m	35 m x 3 m	50 m x 3 m	25 m x 3 m	50 x 3 m	25 m x 3 m
- Area :	75 m ²	105 m ²	150 m ²	150 m ²	300 m ²	300 m ²
Disinfection-depth 90° C.	Average times of application of the sheets on the soil, according to the model of sheets and the wanted depth.					
5 cm	0 H 41	0 H 36	0 H 34	0 H 46	0 H 40	0 H 45
10 cm	1 H 21	1 H 12	1 H 07	1 H 33	1 H 20	1 H 30
15 cm	2 H 01	1 H 48	1 H 42	2 H 19	2 H 00	2 H 15
20 cm	2 H 42	2 H 24	2 H 15	3 H 05	2 H 40	3 H 30
25 cm	3 H 23	3 H 00	2 H 49	3 H 52	3 H 20	3 H 45
30 cm	4 H 03	3 H 36	3 H 23	4 H 30	4 H 00	4 H 30
35 cm	4 H 43	4 H 12	3 H 57	5 H 24	4 H 40	5 H 15
40 cm	5 H 24	4 H 48	4 H 40	6 H 04	5 H 20	6 H 00
45 cm	6 H 05	5 H 24	5 H 04	6 H 57	6 H 00	6 H 45
50 cm	6 H 45	6 H 00	5 H 37	7 H 42	6 H 40	7 H 30
55 cm	7 H 25	6 H 36	6 H 12	8 H 30	7 H 20	8 H 15
60 cm	8 H 06	7 H 12	6 H 45	9 H 15	8 H 00	9 H 00

ATTENTION

These times are only given for indication.

They would change according to different elements such as the place of disinfection (field or green-house), the weather, the nature and the preparation of the ground.

IMPORTANT TECHNICAL DETAILS

" SIMOX " steam-generators

Leaders in the European market, because they are technically ahead.

Familiarize yourself with the technical details specific to our machines.
You will not find them simultaneously in any other range of equipment.

* Our **steam-generators** are manufactured from rigorously selected steel. The thickness of the steel we use is superior to that required by safety standards. Inside the machine, the thickness of the steel can reach as much as 6 mm. The tubes respect the French standard :
NF A 49 112.

* All our models are equipped with a **steam-superheater**.
This element protected by a **stainless steel** plate, enables the steam to be heated to temperatures of between 170 too 185° C. The resulting **dry steam** can be canalized over a long distance, if necessary.

* There is a heat-retaining chamber for the pre-heating of water on each side of the main boiler. These chambers can be dismantled (a SIMOX exclusivity !) and open out on both sides, into the interior of the machine. Thanks to these pre-heating chambers, the water which arrives in the main boiler is already at a high temperature. This presents two advantages :

- A saving of energy : the delta of water evaporation is reduced.
- Thermal constraints in the main boiler are eliminated.

* A **steam-dome** (a SIMOX exclusivity !) situated above the main boiler, allows the level of water in the machine to be raised and the tubing to be immersed. The steam tubes are protected by the water and their lifespan is greatly lengthened.

* There three inspection hatches on the main boiler of most models (another SIMOX exclusivity !). They allow the inside of the machine to be checked easily and facilitate all types of cleaning.

* On all our **steam-generators** fitted with a two-speeds burner, a double control "**on/slow**" and "**on/off**" is fitted as a matter of course. This allows considerable saving of energy to be made, and means that the same quality of steam is available whether the machine is functioning at full or reduced speed.

* Our standard **steam generators** are fitted with a fuel-oil or diesel oil burner. They can, however, without any modification and at any time, be fitted with a gas burner.

" SIMOX " STEAM GENERATORS . . .

- ❖ **A perfected range of equipment !**
- ❖ **Well-tried and tested machines !**

It is IMPORTANT to make the right INVESTMENT Consider your decision carefully !
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