The TPT Technology Manual

By Marty Fischer, CEO Lazo TPC Global, Inc.

July 9 2012

FOREWARD

My fascination with agricultural production and marketing goes back to the early 1970s when as a young advertising executive, I had the opportunity to develop advertising and marketing campaigns for the California Table Grape Commission, the California Strawberry Advisory Board and the National Potato Promotion Board. In 1978, I entered into a partnership that became Scroggin & Fischer Advertising (SFA), a small San Francisco advertising agency that grew to handle The California Table Grape Commission, The National Pecan Marketing Council, The New Zealand Apple & Pear Board and other agricultural and non-agricultural businesses. In 1987, SFA was sold to BBDO and I became General Manager of BBDO, San Francisco until retiring from advertising in 1991. I then became Managing Director of the Chilean Fresh Fruit Association, North America from 1991-1997.

I have been involved with Lazo TPC Global, Inc. since November of 2006 when renewing my acquaintance with Chilean grower Florencio Lazo Barra. From January 2007 through January 2010, I served as a founder and CEO of Lazo TPC Global, Inc. During this period, the company focused its sales and marketing efforts on the Thermal Pest Control aspects of the technology. Machines made by Lazo in Chile were shipped and used by growers in Chile, the United States, Argentina, Uruguay, Peru, Europe, South Africa, New Zealand, Turkey and Australia.

During this 2007-2009 period members of our team had the opportunity to meet with growers all over the world and listen to their experiences with the Chilean built TPC equipment and the technology (High Heat Air Blast). This enabled us to gain an insight into what appeared to be happening and not happening with both the equipment and the application of the technology. This depth of experience, some recorded using appropriate test protocols and some anecdotal, convinced me that there was an enormous promise to the technology. While the pest control aspect of the technology would allow users to reduce their dependency on pesticides, it was by no means, at its early stage of development, a total replacement for all pesticides. Instead, it became clear that the best use of the machine as it relates to pest control and reduced use of pesticides was when it was used as the central part of an integrated pest management approach.

Prior to and during the 2007-2010 period evidence began to mount that the magic of the technology was not only in its ability to reduce pesticide use, but in its ability to somehow manipulate various aspects of the horticultural process and serve in several different ways to help growers improve yields and the quality of production. Many questions were raised as these observations were made. Why were some growers experiencing increased fruit set and bigger fruit size? What was leading toward healthier looking greener plants and trees? What was generating thicker skins and stems? Why were growers reporting earlier harvests and or higher BRIX? Until recently these side benefits remained a mystery to be explored.

After being separated from the company in January of 2010, I returned as CEO in November 2011 with a view toward creating better equipment and proving the technology, both the pest control (TPC) and the newly defined “side benefits”. These benefits were recently the basis of a patent application dubbed Thermal Plant Treatment (TPT) to encompass the broader aspects of how the technology affects plants and crops.

I’d like to recognize and thank Dr. Art Dawson of the Dawson Company who has served as the Lazo TPC Global Chief Science Officer for over four years and whose help and guidance have been invaluable in understanding the TPC and TPT technologies as well as in the preparation of this document.

HISTORY OF THERMAL PLANT TREATMENT

In late November of 2006 I bumped into Florencio Lazo Barra at the airport in Santiago de Chile. I had known Lazo as a result of my position as Managing Director of The Chilean Fresh Fruit Association, North America from 1991-1997. Lazo was a grower of fresh fruit at that time and a Chilean fruit industry leader He proceeded to tell me of the exciting invention he had dubbed and patented as Thermal Pest Control (TPC). In the ensuing month, we communicated frequently and together with my partners in the US and Chile, we created Lazo TPC Global, Inc., a California Corporation in January of 2007, to market this new technology throughout the world.

Lazo’s experience with TPC at that point had been largely based on successful grower testing within Chile and confined primarily to higher end specialty fruit crops such as wine grapes, table grapes, blackberries and cherries. TPC was also experimented with on a few row crops including romaine lettuce and processing tomatoes. The goal of these tests had been focused, and their success judged, on replacing the use of “pesticides” through the disease and pest management capability of TPC. Most of the evidence of efficacy was anecdotal in nature though there was University involvement in testing done in New Zealand on wine grapes at Clive River Vineyards and work was done in 2007/8 in Chile by Catholic University on table and wine grapes. [1,2]

During 2007-2009 some 100 machines were sold in the US, the UK, Europe, South Africa, Argentina, Brazil, Peru, Turkey, Israel, Uruguay and Chile. There were difficulties encountered everywhere with equipment performance and inconsistencies. The TPC machine that was built in Chile to local safety, durability and performance standards was

Machine

generally unacceptable in North America and Europe. Company ownership entered a period of disagreement and dispute in early 2010 as to how best to build the company and technology. The dispute was finally resolved in late 2011 and the focus has now returned to testing, proving and marketing the technology.

Starting in 2012, the Company has developed a newly engineered machine that is far more durable, safer and friendlier to operate than the earlier equipment. The new machine has thus far proven to be more reliable and consistent in delivering the technology. This machine is now in field tests on wine grapes in the Napa Valley, Sonoma and Central Oregon. Tests are also being conducted in Hood River Oregon on Pears and Cherries. In Central Oregon additional field trials are under way on blueberries, blackberries and kiwi berries. There is also a nut set test underway in California Almonds. By late 2012 we will have far more insight on the technology and this testing process will continue indefinitely.

THE TREATMENT EXPLAINED

From the beginning of the discovery in 2001, the TPC technology can be best described as a heat treatment at approximately 100º C (215ºF) expelled at a wind velocity of 100-125MPH (160-200KPH) from a tractor pulled machine moving at 3-4MPH (5-6 KPH). This basic treatment protocol has remained consistent in most all of the testing done or being done to date. The technology is applied weekly from bud to harvest during the growing season. This basic protocol has been consistent crop to crop and year to year except in unusual situations where experimentation has occurred. There is no reliable knowledge of the effect of the technology when wind speed and heat range is varied significantly. Since good results have been achieved when this heat and wind speed have been maintained, any variations are not recommended. Experimentation of wind speed and heat range remains an area for future research and experimentation under careful control and testing management.

During the 2007-2009 testing years it became clear that the treatment also had effects not originally considered as pest control. Rather, observations were clear that a raft of fruit quality and plant health benefits were being observed. In March of 2012 the company filed a provisional US patent on what is now called Thermal Plant Treatment with plans to final file and protect this IP globally by early 2013.

TREATMENT EFFECTS

There are many uses of Thermal Plant Treatment that fall into several general categories appropriate for agricultural needs:

1. **Disease & Pest Control** – The basis for the original TPC patent was the technology's insect/fungal control capability as experienced by many growers who tested the product. It is believed that this control can be brought about by the hot air windblast that disrupts insect and fungal development [1, 7, 8, 9, 10, 11, 12]. The physics are well established in that smaller things heat up faster than bigger

things. Microorganisms heat up instantly which is why we have experienced good control over most small insects like thrips [1] and fungus [3].

2. **Aid To Pollination** - The second effect of TPT is increased fruit/nut set when applied at blossom in two or three applications depending upon traditional lengths of bloom fertility. In various wine grape tests conducted in New Zealand in 2005 and more recently in Sonoma and Napa Valley California in 2012, fruit set improvement has ranged from 11-27%. In a 2005 test on Pinot Noir in New Zealand [2] the actual berry count per bunch was 13.8% greater [2,4] .
3. **Plant Shock & Stress** – TPT also brings about a host of self-defense Darwinian type reactions of the plant itself that range from increased resistance to pests, thicker skins on fruit to protect moisture from heat, higher polyphenols (antioxidants), deeper coloration, larger fruit, thicker leaves and stems, earlier and higher sugar levels and other reactions to the heat blast all of which require much greater study [1,2,3].
4. **Reduce Moisture** – Anyone who farms dreads rain during the growing season as moisture frequently ignites the growth of fungal diseases. TPT can be used either with the burner on or off to dry up and/or blow standing water from fruit and plants thus reducing fungal growth. [10,12]
5. **Weed Control** – The new generation of TPT equipment will also provide weed control via a weed burner that will be offered as an optional unit. Powered by on board TPT Propane, this unit will complete the full spectrum of controls that will help growers reduce their use of all pesticides (insecticides, fungicides and herbicides).

Depending upon the crop, any one of these potential benefits can be viewed in the context of problem solving thus making a cost benefit analysis possible. This will be discussed later in this document and growers are encouraged to identify their specific problems and to view the potential bottom line impact of TPT as it relates to their own crops, locations, climates, economic (pricing and crop loss or damage history). Every farm and crop situation varies somewhat and TPT needs to be viewed as a potential solution within that individual context.

ACREAGE COVERAGE

The calculation of how many acres one machine can cover is always a difficult question to answer since this is dependent on many variables. The variables include row width, tractor speed and how many hours are worked in a week. This also varies by the size of the TPT machine being used. Currently two models are available: 1) 42” wide and 2) 54” wide.

In general the LP gas supply for the two current models each burn 11-12 hours at 100º using 150 gallons (568 Liters). The following table assumes tractor speed of 3.5 MPH (5.6KPH) and 100ºC (212ºF) and 11.5 hours per day, 6 days a week. Since the treatment should be applied weekly, acreage is capped at what can be covered in one week. The acreage numbers below DO NOT INCLUDE TURN TIME AND DISTANCE which should be deducted from the acreages to be covered based on estimates of their percent versus row length.

ROW WIDTH FEET	METERS	ACRES PER HR.	HECTS PER HR.	ACRES/DAY 11.5 HRS	HECT/DAY 11.5 HRS	ACRES 6 DAY WK	ACRES 6 DAY WK
6	1.83	2.47	1.00	28	12	170	69
8	2.44	3.30	1.34	38	15	228	92
10	3.05	4.12	1.67	47	19	284	115
12	3.66	4.94	2.00	57	23	341	138
16	4.88	6.59	2.67	76	31	455	184
20	6.10	8.24	3.33	95	38	569	230
24	7.32	9.89	4.00	114	46	682	276

ESTIMATING COSTS OF TPT

Add to this gas cost of approximately $30/hour (13 gallons/hour at $2.25/gallon) plus labor of $20/hour and one arrives at an estimated hourly cost of $56.50 per hour of application plus tractor costs. These costs are not intended to be exact, but to provide a working formula approach for growers to be able to adjust the numbers to their actual costs for labor and propane.

Since most cost benefit analyses are done on a per acre/hectare cost, using the hourly cost of $56.50 reveals a cost range based on crop row width which in this case is synonymous with the area covered by each pass or treatment application of the TPT machine.

ROW WIDTH FEET	METERS	ACRES PER HR.	HECTS PER HR.	TPT COST PER ACRE	PER PASS PER HECT
6	1.83	2.47	1.00	$22.87	$56.50
8	2.44	3.30	1.34	$17.12	$42.16
10	3.05	4.12	1.67	$13.71	$33.83
12	3.66	4.94	2.00	$11.44	$28.25
16	4.88	6.59	2.67	$8.57	$21.16
20	6.10	8.24	3.33	$6.86	$16.97
24	7.32	9.89	4.00	$5.71	$14.13

Using the above set of numbers on cost per acre/hectare for one pass of TPT, it is now possible to construct cost benefit analyses of various potential outcomes of the technology. A few real examples based on historic results follows.

COST BENEFITS OF TPT

The purpose of providing the two cost benefit analyses examples below is to provide a model by which growers can calculate the benefits of TPT in real dollar terms based on their own numbers. There are many potential ways to use TPT as a cost efficient and effective method to solve specific grower needs with specific crop and varieties. Some of these are covered in the section that follows these cost benefit analyses.

1. **Fruit Set** – If used only at blossom in an effort to create greater fruit set and subsequent yields on difficult to set fruit varieties, the protocol would include two to three passes of the machine during the flowering period. Historically, wine grape tests done in 2012 have reported anywhere from 11% to 27% greater fruit set [5,13] when TPT is used in this manner and not continued for season long affects and benefits. Assuming for a moment that the fruit is harvested at the same weight for TPT vs. no TPT it is possible to theorize potential bottom line benefit. Below is a table that looks at potential increased yields and additional revenue gains resulting from application on various crops. In all cases a 10% production increase is estimated. Various industry and government reports were used to obtain the production and grower price information.

CROPS	FEET/ROW	NORMAL YIELD/ACRE	NORMAL GROSS/ACRE	TPT EFFECT PLUS 10%	TPT COST PER ACRE	TPT GAIN PER ACRE
BLUEBERRIES	6	10,000	$ 30,000	$ 3,000	$ 69	$ 2,931
WINE GRAPES (AVG CA)	8	14,600	$ 4,205	$ 420	$ 52	$ 369
WINE GRAPES (AVG OR)	8	5,160	$ 4,928	$ 493	$ 52	$ 441
TABLE GRAPES (AVG CA)	12	21,000	$ 10,500	$ 1,050	$ 34	$ 1,016
CHERRIES (CA)	16	8,640	$ 16,643	$ 1,664	$ 26	$ 1,639
APPLES (WA)	20	36,300	$ 10,890	$ 1,089	$ 21	$ 1,068
ALMONDS (CA)	20	2,000	$ 3,800	$ 380	$ 21	$ 359

2. **Pesticide Reduction** – This is a fairly easy calculation for most growers in that they are very familiar with their unique situations and the amount/cost of pesticides used to manage their season long pest issues. It is very difficult to generalize in this regard, but for comparison below are the season long TPT costs that would be experienced if a grower decided to use TPT as the central tool in an Intergrated Pest Management (IPM) type approach. As an IPM approach the focus on the use of TPT would be to reduce pesticide use for cost, environmental and community/worker safety reasons. Using TPT to control the broad spectrum of diseases, the grower would monitor insect and fungal development and only use pesticides should the need arise. When used this way many growers have experienced significant reductions in pesticide use.

CROPS	FEET/ROW	TPT PASSES SEASON	TPT COST PER ACRE/SEASON
BLUEBERRIES	6	12	$ 274
WINE GRAPES (NAPA)	8	18	$ 308
WINE GRAPES (AVG OR)	8	18	$ 308
TABLE GRAPES (AVG CA)	12	16	$ 183
CHERRIES (CA)	16	12	$ 103
APPLES (WA)	20	20	$ 134
PEARS (OR)	20	20	$ 134

POTENTIAL APLICATION BENEFITS AND PROTOCOLS

TPT SEASON LONG – While use of TPT can be employed short term to provide a specific benefit some of which are discussed under PROBLEM SOLVING, the full raft of benefits are enjoyed if the technology is used regularly from either bud or blossom through harvest. This assures maximizing not only the pest control benefits, but also improving the degree of potential quality benefits the technology has to offer.

To fully comprehend the potential of TPT, It is important to understand that plants have their own self-defense systems. Plants, not unlike insects, fungus and all living organisms, adapt to different environmental threats in order to survive (http://silicafarming.com/theories/plants-and-their-defense-system/). Those who grow crops see this in the way insects develop resistance over time to specific insecticides. One of the main roles of a plant, like any organism, is to reproduce itself. To do so plants are equipped with various mechanisms or methods for reacting to threats to its production of seed. These reactions are grouped collectively and dubbed "SARs" which stands for systemic acquired resistance (Wikipedia) According to Wikipedia *"The **systemic acquired resistance** (SAR) is a "whole-plant" resistance response that occurs following an earlier localized exposure to a pathogen. SAR is analogous to the innate immune system found in animals, and there is evidence that SAR in plants and innate immunity in animals may be evolutionarily conserved. Plants use pattern-recognition receptors to recognize conserved microbial signatures. This recognition triggers an immune response."*

While we believe that this Wikipedia definition is directionally correct, those of us who have worked with TPC and TPT for some 5 years now take issue with certain terms used in their definition as it relates to plant SARs. One such exception is the word "pathogen" which we would replace with "actual or perceived threat". In addition it has been our observation that while some plant SARs are "whole-plant" in nature, others are more localized within the plant system and are observed as if the plants sensory system and reactions may be far more localized than previously observed.

One of the problematic issues of the original TPC machines was that the delivery of heat and wind was more intense at the middle of the blast zone than at the extremes. This intense area was 4-5 feet in height or width depending upon how the venting was configured. This was perfect for hitting the fruit bearing areas of smaller plants such as wine grapes, which is within the 4-5 foot zone, but had extreme variation in heat and wind speed on a 12-foot tall tree. In these taller trees that bore fruit beyond the 4-5 foot zone, larger fruit was observed within the 4-5 zone than in the less intense zones at the top and bottom of the tree. The further away from the intense blast, the smaller the fruit and it seems clear that the SARs were more localized in response.

Another fascinating example of this localized reaction was observed in table grapes. In Latin America and most of Europe table grapes are grown on an overhead trellis system with the grape bunches hanging down below the canopy. The TPC machine passed under the hanging bunches and the heat blast hits the grape bunches first with full intensity and then the canopy above with less intensity. This produced many SAR benefits in the fruit that were significantly different than conventionally produced table grapes. TPC grown grapes were larger, had thicker skins, higher BRIX and stronger cap stem attachments (less shatter) when harvested at the same time as conventionally grown table grapes.

When these same TPC machines were tested in California, the results were quite different. The reasons became obvious in time. In California the testing was primarily done on California trellis systems that are configured so that the vines are trellised vertically and the fruit is produced within the canopy that extends out and down creating a shield between the TPC machine and the grapes. Thus the intense heat blast was directed first at the overhanging canopy that shielded the grape bunches from the intense blast. The result was bigger leaves and more vigorous canopy. We believe the SAR logically did what one would expect and that was to protect the grapes by increasing the size and thickness of the shield. Again this seemed to be a localized reaction.

When TPC is used season long we have seen several characteristics emerge as a probable result of SARs. Some of these are as follows:

1. **Earlier Harvest or Higher Sugar** . TPT can be used to harvest earlier, if harvest is determined by BRIX level, or to increase BRIX, if harvest is determined by a fixed date or event like the first rain or freeze threats. TPT appears to exert enough stress on plants to make the plant rush the development of its fruit (seed). If harvest is delayed to coincide with conventional harvest, the TPT grown fruit will have higher sugar. We have seen this repeated in many situations. Higher sugar was seen in NZ Pinot Noir wine grapes (+2.5%) [(2)] ; Processing tomatoes in Chile (+17.5%)[(15)], Kiwi in Chile (+21%)[(14)] and cherries in California (+15.3%)[(4)]. Growers who harvested earlier because the TPT treated fruit reached BRIX target levels earlier include numerous table grape growers in Chile (7-10 days), Cherries in California (4.6 days) and other anecdotal observations.
2. **Thicker Skins** – The SAR in the case of thicker skins on fruit appears to be one of the plant responses for protecting moisture in the fruit from high heat. Thicker skins have been measured on TPT grown Cherries (+6.6%), Kiwi (+1%)(Agricola Cuartel) and we have also been told this response has been seen but not measured in wine and table grapes [(9,10,12)] and tomatoes [(14)]. Thicker skins are a benefit in both fruit appearance; lower handling damages (shrink) and can extend shelf life and storage capability.
3. **Thicker Leaves and higher Chlorophyll** – This is a fascinating phenomenon that to date is purely anecdotal. The phenomenon was first observed on Florencio Lazo’s wine grapes in Chile in 2005 where TPC treated vine leaves were photographed from the air and the test plot was greener. In the earlier years of experimentation, growers frequently observed that their plants looked bigger, leaves thicker and deeper green than their conventionally grown plants. This SAR phenomenon needs much more study as it begs the question as to whether the increased plant and fruit size is the possible result of greater photosynthesis or whether the SAR is an attempt to protect leaf moisture by increasing leaf thickness. Either way, TPT is frequently reported to create greener, larger and more vigorous plants
4. **Thicker Stems** – This SAR benefit was measured in the Clive River Vineyard testing in New Zealand in 2005 [(2)]. In this case the size of the TPT rackus weight was 12% heavier. This SAR is likely related to the plant protecting its seed from higher wind speed by increasing the strength of the stems. While generally not an

issue of economic importance in most crops, table grape growers have observed less shatter (grapes falling off stems) on TPT grown grapes indicating a stronger stem and stem attachment [2].

5. **Larger Fruit** – The SAR observed here has been consistent with TPT treated fruit. We believe this may be the plant's way of insulating its seed from heat and wind damage although other issues may be at work including higher photosynthesis. Larger fruit has been measured in NZ Pinot Noir (+5.72%) California cherries (+5.1%) and in Chilean kiwifruit (+24%)[1,2,4,14]. This observation has also been made in anecdotal comments for TPT grown peaches, plums and nectarines, blueberries, blackberries, apples and table grapes.

PROBLEM SOLVING - As discussed earlier there are many different, related and unrelated reasons that growers might employ TPT to resolve issues they face with individual crops and varieties with unique issues. What follows is a list of such possibilities and the application protocols suggested for resolving each problem.

1. **Increased Fruit Set** – As discussed earlier fruit set is a universal benefit except for crops and varieties where thinning is employed and increased fruit set is a problem not a benefit. To achieve greater fruit set, apply TPT during blossom where the heat blast of TPT acts as a pollinator by spreading pollen. This method of pollination seems to set fruit evenly so that maturity occurs in a more uniform time period. Usually we suggest three applications with the first about 1/3rd of the way through blossom, the second at about 2/3rd blossom and the last at full blossom. Since the objective is to spread pollen, we suggest that the fan be run at full speed of the PTO or 540 RPM. The gas regulator should be set at a PSI of 70. Tractor speed may be varied but a normal 3.5 MPH is recommended.
2. **Encouraging Early Blossom** – In certain situations, growers have encouraged earlier blossom by applying TPT prior to and during early bud break. In this application, the protocol would be to apply TPT every 3-4 days from bud break until blossom. While wind speed and heat intensity have not been experimented with, it is believed that longer heat duration would be desirable in this application. We suggest a PSI of 80 and a mid range wind speed in the 200-300RPM range. Tractor speed should also be reduced to 2MPH.
3. **Late Season Coloration** – One problem that plagues certain crops or varieties has been achieving deep coloration. Coloration is usually successful when late growing season temperature ranges are greatest as a result of cool nights followed by hot days. Some growers have used TPT to artificially create greater ranges of temperature and this has met with mixed results. All of the results to date have been anecdotal. Late season application of TPT starting at veraision is reported to bring on color faster and to generate earlier harvest due to improved sugar and coloration.
4. **Holding Wine Grapes on The Vine** – Where sugar development is needed to produce better wines it is frequently difficult to fight late season rains. TPT not only increases sugar levels faster [1,2] but also can be used to 'dry off' late season grapes as a possible means of reducing the breeding grounds of fungus.

HOW TO SPECIFY PROPER VENTING

The design of vents for TPT is based on the belief that it is necessary to cover the entire plant with an even delivery of heat and wind speed in order to effect localized and systemic results. While we are designing new adjustable vents that allow for on-site adjustment, currently vents must be specified by the grower and built to crop specifics at the factory. During application the outer edge of the vent should be approximately 12 inches (30 cm) from the outer canopy of plants being treated. TPT equipment is designed to heat the air to 100ºC at the vent exit when the PSI valve is set at 70 PSI and the PTO drive operates at 540 RPMs.

When the ambient temperature is 60ºF (15ºC) , the TPT treatment temperature reduces to 80-85ºC (180ºF) heat 12 inches (30 cm) beyond the vent at the outer edge of the plant. At 40 inches (1 meter) from the vent the heat will be approximately 48ºC (120º F) and at 60 inches (1.5 meters) it will be approximately 38ºC (100º F). The treatment temperatures will vary significantly depending upon ambient temperature, humidity and wind factors. Because of this variability we recommend treatment be made in the cooler parts of the day and when wind is less active in order to maximize the difference between ambient conditions and TPT treatment.

The standard vent supplied with TPT machines will provide plant coverage along an approximate plane measuring 1.5 ft (0.5 meters) to 8ft (2.4 meters) off the ground when the vents are at a distance of 12 inches (30 cm) from the outer canopy of the plant.

The current machine design comes in two widths. Both machines are 5 ft (1.53 meters) in height. The narrow machine is 43” (1.1 meter) wide and can be used for 6-7 ft (1.8-2.1 meters) centered rows. The wider machine is 56” (1.4 meters) and appropriate for treating plant rows that are 8 ft (2.4 meters) or greater in width. Extension sleeves can be added to the vent sleeve/chutes of either machine in order to meet the needs of plant rows wider than 8 feet (2.4 meters).

While this standard vent is appropriate for vertically oriented plant crops up to a maximum height of 8 ft (2.4 meters), use on taller trees, angled or overhead trellising requires different vent designs that are specified when ordering the equipment. We do not recommend the use of the two standard width machines for any crop that is greater than 10 ft (3 meters) in height. A “double stack” 4 vent systems is in development and should be available in prototype for testing on taller trees over (10 ft. or 3 Meters) prior to the 2013 Northern Hemisphere growing season.

Exhibit A is an ordering form we recommend be used in determining specific venting design needs. This form should accompany all orders.

HOW TO SET UP A TEST

Protocols:

Testing protocols and methodologies for evaluating the effects of TPT on various plant growth attributes are no different than similar protocols for evaluating the effects of pesticides or plant nutrients. The job is to identify the attributes of interest, how these attributes will be measured, and set up an in field testing protocol designed to eliminate bias within application of the test procedures and within eventual evaluation of results.

Testing protocols will require three basic components regards field plot design: treated portion, boundary or untreated adjacent rows portions, and the control or entirely untreated portion. The test results will be measured by comparing crop attributes on the treated portion and on the control or untreated portion. The results of the boundary portions will not be included as test results.

Field plot designs are generally "Single Factor Experimental Designs" due to the fact that the TPT treatment is not a variable input but is a constant input of heat, wind and forward speed. Such "Single Factor Experimental Designs" should include some accommodation for replication such that the natural variability of edaphic conditions, slope, sunlight, etc. can be neutralized in the comparisons within the test. Variability created when the TPT treatment is compared vs. the control or non-treated block should be greater than the variability of the natural conditions found within the experimental block. To insure that this is the case, classic randomized block designs, either "complete block design" or "incomplete block design is recommended",

Due to the logistics of applying the TPT treatment, the need for running the equipment along a row of plants at a constant rate of speed, constant temperature and constant wind speed, it is often practical to make experimental treatments on a fairly long row of plants vs. making the treatment to one individual or to a very few "experimental" plants. This factor militates toward treatment of parallel rows of plants which are separated by two or more boundary rows and which are parallel to the non-treated control rows. If such an arrangement can be replicated in parallel blocks within a field, the experimental design will be improved.

However it is often the case that only one row of TPT treatment with its adjacent boundary rows and non-treated control row are available for the experiment. In such cases, the evaluation of plant attributes can be made with randomly selected plants, in suitable numbers of individual replicates, "down the row".

Excellent advice on planning an experimental design may be found in: Demonstration and Research Uses of Pesticides, Diane Clark and Patrick J. O'Connor-Marer, University of California Statewide Integrated Pest Management Program, Agriculture and Natural Resources Publication 9001.

Evaluation of Attributes:

Commonly anticipated results of TPT are improved fruit set; improved fruit size; earliness of color and brix; improved total yield and various horticultural attributes such as chlorophyll content of leaves. Beyond these results are anticipated reduction in pressure from various insects and diseases.

Each of these anticipated results represents a specialized attribute pertinent to the crop type being tested. Each of these anticipated results represents its own specific technology for evaluation. Fruit set, for example, may be measured by simply counting the number of fruit on a plant or plant part, but the timing of this count relative to the growth cycle and production cycle of the specific crop in its specific area will be dependent upon local factors known only to the grower and his crop consultants.

Measurement of brix in fruit may be performed in the field or in the laboratory on samples selected in the field by adherence to the predetermined field trial design. The timing of these measurements relative to harvest and the timing of these measurements economic factors which impact the value of TPT to a specific crop can usually be determined by the grower and his crop consultants.

The most effective principle for evaluation of attributes is that their evaluation be made in concert with a predetermined, statistically rational, and economically motivated evaluation plan.

As the plan is being conceived and documented, important decisions must be made relative to the most suitable means of measurement, a practical but statistically rational number of replicates and performance of measurements on schedule.

Documentation of Plan and Results:

Documentation of results relative to the predetermined plan is of great value. Deviations from the plan should be recorded and "progress points" during the crop growing cycle can be documented relative to the treatment/control plots.

Photos, photos with suitable labels and/or placards are always recommended. Photo documentation enhanced by labeling is valuable during the crop growth stage and also during the results/data collection process. Documented photos are always valuable for interim and final reports.

Documentation of numerical values should be of paramount consideration. Templates should usually be designed and prepared during the pre-planning phase of a test.

The process of template design usually lends further discipline in field plot design. Errors in design, failure to include an adequate number of replicates, anomalies in the field itself, etc. are often discovered when the data collection template is being considered relative to the exact spot in the test field where it will be used.

Data collection templates are designed with the eventual statistical evaluation process in mind. The statistical evaluation process is often selected with the eventual final report presentation format in mind.

On a practical level: Prepared templates simplify data recording and data evaluation; saving time and money.

TPT Operational Parameters.

Effective treatment and meaning full test results can be obtained when the TPT treatment is made in a manner which can be reliably measured, quantified and repeated.

For purposes of evaluating economic benefit of TPT to the crop, the factors of air temp, wind speed, forward speed, vent spacing and direction, row/turn around procedures, distance of TPT device to the plant skirt/trunk/top should be predetermined, documented, demonstrated, monitored and maintained throughout the test treatment.

Thus, considerable pre testing and measurement is required before TPT can be applied in a technically reliable and repeatable manner. It is recommended that the user contact and utilize all resources available from the TPT sales/technical team. For the year 2012, this contact should be made to Rick Benson 415 385 5742 (USA).

EXHIBIT A ORDER FORM

N°

MACHINE ORDER FORM

agrothermal systems

CUSTOMER

ORDER DATE (DD / MM / AA)

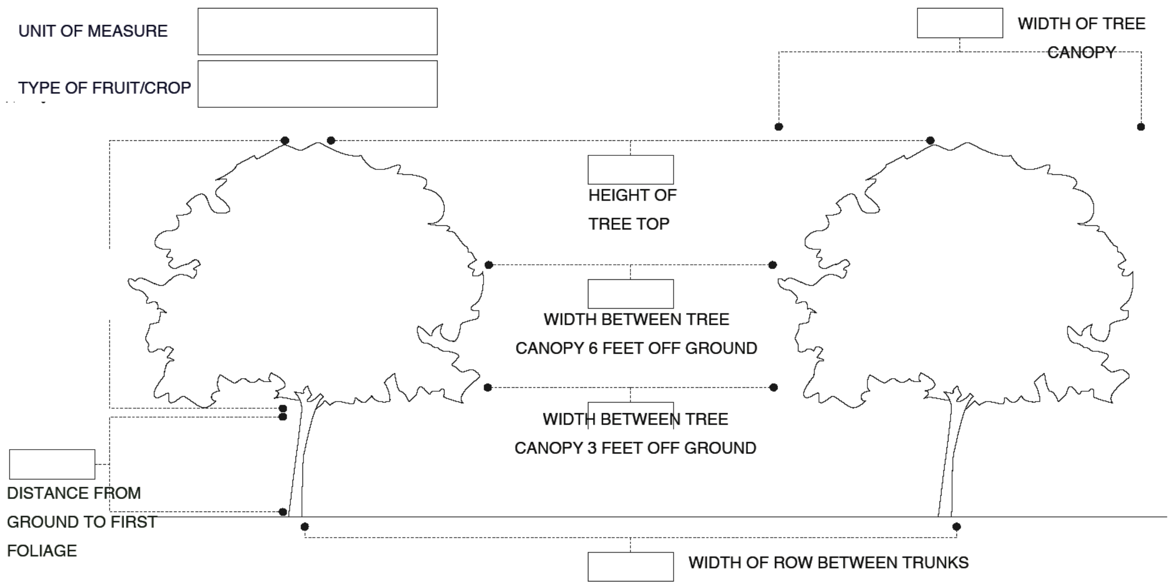
PREFERRED DELIVERY DATE (DD / MM / AA)

NUMBER OF MACHINES

FIELD AND PLANT DIMENSIONS

UNIT OF MEASURE

TYPE OF FRUIT/CROP



CUSTOMER

Company Name

Address

City/Country

Phone Number

Fax Number

Contact Name

Co. Tax Number

IMPORTER / AGENT

Consignee

Address

City

Country

Phone Number

Fax Number

Email

Shipping Method

Shipping Company

Other Directions/Instructions:

VALUE / SALES PRICE

Value in USD

Method of Payment

1	Catholic University	2006/7	Santiago de Chile Chile	Dr. Doris Prehn,et al Dept of Fruit and Enology, Report to Cooperator (F. Lazo)
2	Eastern Univ of Technology ("Clive River" Project)	2005	Taradale, New Zealand	Dr. Robinson Vargas, Nick Verry, Report to Cooperator (F. Lazo)
3	Geisse, Mario	2008	Casa Silva Wines, Chile and Cave Geisse, Brazil	Geisse, Mario: Testimonial
4	Lazo TPC Global, Inc), ("Sambado Cherry Test")	2008	Arvin, CA, USA	Rick Benson, AgroThermal Systems, Internal Technical Trial Report
5	Lazo TPC (AgroThermal Systems, Inc	2012`	Napa, CA, USA	by The Dawson Company, Chino Hills, CA, report to Client (AgroThermal Systems)
6	Pimentel, David	2005	Cornell Unviersity, Ithaca, NY	Environment, Development and Sustainability (2005) 7: 229-252
7	Geisse, Mario	2010	Cave Geisse Wines Brazil	http://youtu.be/tJEB91prBuo
8	IBRAVIM	2009	Brazil Wine Industry Association Association	Website News Article
9	Echeverria, Rodrigo	2008	Table Grape Grower Los Andes, Chile	Testimonial

10	Geisse, Mario	2008	Casa Silva Winery Colchagua Valley Chile	Testimonial
11	Bozzolo, Arnaldo	2008	Table Grape Grower Maipu, Chile	Testimonial
12	Salomo, Ana Lorena	2008	Porta Wines Enologist	Testimonial
		2012	Napa & Sonoma, CA, USA	
13	Lazo TPC (AgroThermal Systems, Inc), (TPT Testing Napa and Sonoma)			Rick Benson, AgroThermal Systems, Internal Technical Trial Report
14	Sebastian Lazo	2007/8	Agricola Cuartel Chile	Kiwifruit Testing Internal Report of Lazo TPC Global
15	Cuadro, Mario	2008	Aconcagua Foods Buin, Chile	Process Tomato Test by Mario Cuadro Head Agronomist