
H2K Agro Jamaica Ltd®

TRIAL INSPECTION AND VALIDATION

PROTOCOL

FOR GROWING MEDICINAL CANNABIS

UTILIZING A NOVEL NUTRITION
AND
MICROBIAL TECHNOLOGY

Table of Contents

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M E D I C I N A L C A N N A B I S

BACKGROUND TO PROBLEM:

The growing and production of cannabis in Jamaica has long being carried out by various small, traditional, indigenous and ras tafarian farming groups of the society. Each group has over the years adopted their own styles, methods and more importantly fertilization approach.

However, as the country gets ready to embrace trading of cannabis and its by-products for pharmaceutical, nutraceutical and cosmecutical purposes (and where applicable recreational purposes), the focus has shifted to finding solutions to create methods of production and growing standards that will be in-line with Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP).

GAP is a set of standards that aims to codify agricultural practices at the farm level, to ensure quality agricultural production of foods and non-food products (such as fibre and medicines). Additionally, GAP combines common sense agricultural practices with science and quality control systems, and will simplify the implementation of HACCP, ISO or other quality related standards.

In the context of medical cannabis, GAP is the precursor to GMP – as it ensures consistent production of a safe, hygienic and quality product of known potency and purity – essential to deliver consistent cannabis medicines.

Even though decades of cannabis prohibition have minimized thorough scientific research on cannabis, there are numerous studies that have validated the therapeutic/medical potential of cannabis as a powerful plant medicine, particularly its cannabinoids (such as THC, CBD, CBG and others) along with other compounds (such as terpenes), and their synergistic action known as *The Entourage Effect*.

Plant medicines (especially cannabis medicines) are likely to have a natural variability. Consequently, creating consistent, standardised medicines of known potency and purity can be challenging – but not impossible. Accordingly, quality assurance systems have been developed for herbal medicines, foods and pharmaceutical drugs to address these challenges.

The GAP standards for medical cannabis draw on well documented guidelines for herbal medicines. These standards, often called GACP (Good Agricultural and Collection Practices of Medicinal and Aromatic Plants) are designed to address both on farm safety and sustainability as well as quality production processes.

Any manufacture of medicines intended for most markets, no matter where in the world it is located, must comply with Good Manufacturing Practice (GMP), which is an accepted standard both locally and internationally.

GMP requires that medicines:

- *are of consistent high quality*
- *are appropriate for their intended use*
- *meet all applicable requirements*
- ***manufacturing or production processes are repeatable***

The same holds for any production of cannabis raw material intended for manufacture and retail of medicinal cannabis products, no matter where in the world, must comply with Good Agriculture Practice (GAP),

Good Agricultural Practices (GAP) is necessary to facilitate Good Manufacturing Practice (GMP). Jointly, both standard systems ensure that products are consistently produced, manufactured and controlled according to quality standards. It is designed to minimize the risks involved in any production that cannot be eliminated through testing the final product.

In light of the foregoing, **H2K Agro** with its suite of organic agriculture products and technologies has managed to formulate fertilization programmes that are both repeatable and of a consistent high quality. The programme is capable of supporting the farmers in their production of cannabis to satisfy both local and international requirements for medicinal purposes through its creation of ***i-SOL*.**

iSoL – A comprehensive Fertilization Solution

Organic or Chelated Nutrition

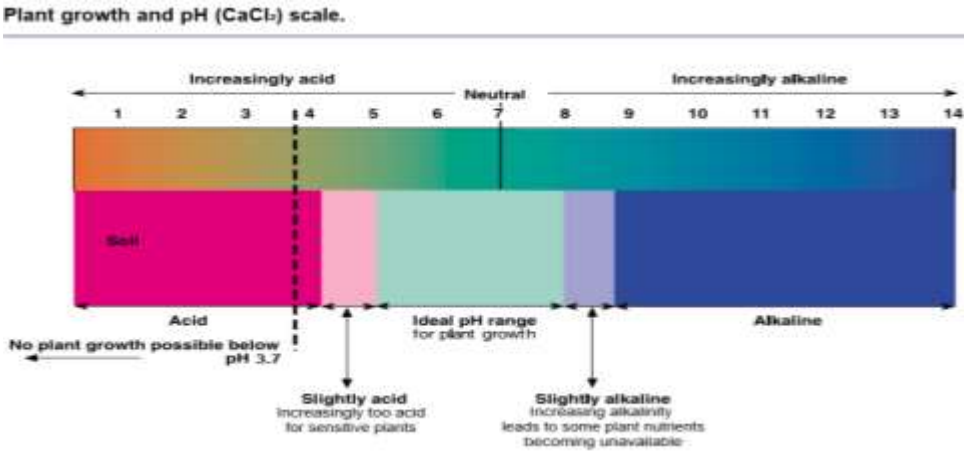
A primary consideration must made to properly understand the principle of i-Sol,a novel and innovative nutrition solution for plants. Any plant that we grow, needs a media to grow in, that media could be soil, or a designed media in case of Hydroponics or soil less farming, or even in case of nutrient film technique, just a nutrient solution. That media will work as a site for the exchange of nutrients between plants and itself. For this nutrient exchange to happen, the media must have a particular characteristic of pH and Electrical Conductivity (EC). Along with other parameters such as moisture content, temperature, oxygen concentration and so on, these two characteristics (pH and EC) will play a vital role in facilitation of the exchange of nutrients.

Soil pH is a major variable since it relatively influences almost all the metabolic functions of a living organism thriving on that soil. When considering a plant, the soil pH completely influences the nutrient availability to the root system's access and eventually the plant.

- Consecutively, the soil pH also determines the rates and states of ionisation of mineral components of the soil, which would be solubilized and thence miscible in the water that feeds up the rooting system.
- Also, pH determines the rates of decomposition of organic matter by microorganisms and the optimal pH for their growth and survival.

- pH around 6 to 7.5 is appropriate for plant metabolism, nutrient availability and pathogen control. Although this very well depends on the crop selection and farming practices employed.

- With a balance of pH, a metabolic equilibrium can be achieved which is beneficial for stress resistance and productivity



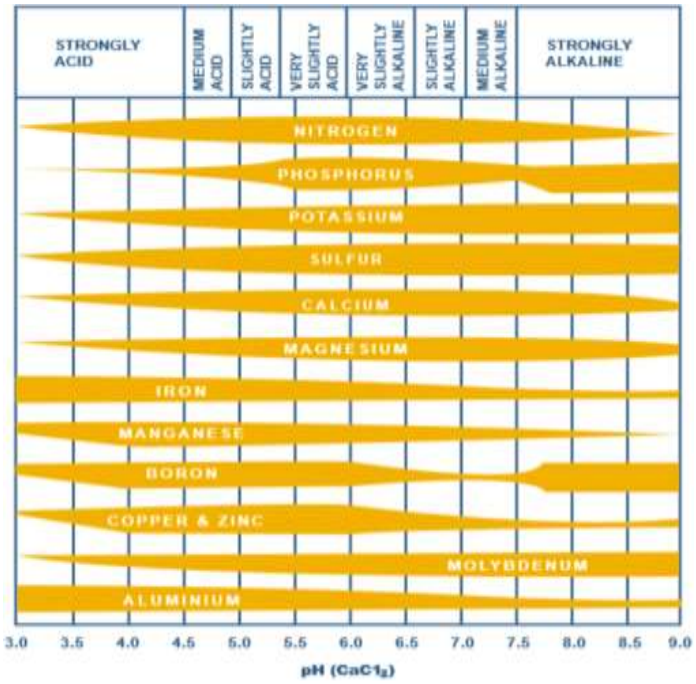
Soil electrical conductivity (EC) is a measurement that correlates with soil properties that affect crop productivity, including soil texture, cation exchange capacity (CEC), drainage conditions, organic matter level, salinity, and subsoil characteristics.

- The electrical conductivity of soils varies depending on the amount of moisture held by soil particles. Sands have a low conductivity, silts have a medium conductivity, and clays have a high conductivity. Consequently, EC correlates strongly to soil particle size and texture.

- EC is related to percent of clay and organic matter (O.M.). As the percent of clay and organic matter increase, the CEC also increases. Research bears out the correlation between conductivity and CEC through its relationship to clay.

Principle of i-Sol:

I-SOL utilises the principle of ionisation of nutrient salts for improving their mobility and availability in a given nutrient solution, addressing the Fertilizer Use Efficiency in a given agricultural system. As we are aware that solubility of ions of minerals salts depend on the pH of the media, the right pH maintained along with substantial buffering capacity of the media, the nutrient capacity can be enhanced. The documented ranges of the mineral ions are as below:



If above range of pH are maintained for the corresponding nutrient, its availability shall be maximum. Exact maintenance of the pH ranges may not be possible; hence, we shall take a broader range to maintain such as 5.5-6.5 which encapsulates availability of all the given ions. The inputs by H2K Technologies shall expediate the Ionisation of these nutrients and then facilitate the maintenance of the pH range to keep the nutrition solution ionised. This shall decrease the over abundant use of farm inputs of fertilizers to consequently save expense and soil deterioration while improving crop performance.

Attributes of i-Sol:

IEC/ H2K Agro Possesses numerous proprietary formulations of Bioavailable Nutrients and Organic Acids which allow exceptional ionisation of compounds with negligible miscibility or reactivity.

Such an example is IEC's WHOLESOME which contains 25% of Elemental Sulphur in a blend of IEC's Proprietary Organic Acids.

Similarly, IEC has several other formulations dedicated to making mineral elements and salts bioavailable like O-PHOS which contains naturally extracted Phosphate which is a precursor for phosphate solubilisation and mobilisation and an activator for PSB and PMB.

Then there is AQUACHIL which is a combination of Natural Organic Acids which can ionise almost any mineral salt or increase their solubility and can be essential to curbing soil salinity and managing good soil salt index.

Likewise, IEC has I-SURGE, a formulation which contains a combination of salts of micronutrients Fe, Zn, Mn, B, and Cu with inimitably processed with Humic acid, Sea-Weed Extract and a mix of Amino-acid which aids in faster mobilisation of nutrients and activate and involve local microbes to assist in the said mobilisation.

In addition, IEC / H2K Agro has several formulations which can address certain typical issues at farm and allow simplification for farming systems and gaining more controlled conditions for resource management and soil and Plant health.

Benefits of I-Sol:

By adopting these formulations, a farmer can reap benefits as mentioned below:

1. **Reduction in fertilizer** requirements **up to 40 – 50%**
2. No more over loading of fertilizers in soils, hence **better soil pH management**
3. No excess Nitrogen uptake, hence **reduced sucking pest & related diseases**
4. **Better flower & fruit** set and uniform fruit size & shape
5. **Lesser labour & material cost** in account of Pest Management Formulation:
6. **Standardized** nutrition program that will bring quality assurance of the buds as in the case Of medicinal Cannabis industry.
7. **Pesticide Free** technology when coupled with the balance of the system.
8. iSol is a revolutionary Nutritional System which will **Chelate the ions / minerals** which by Definition are **Inorganic**.The process of Chelation will render the minerals **Organic** and will Improve the **Bioavailabilty** of the minerals exponentially.
9. The result is that **The Cannabis Plants** will be nourished by a system that is Researched & Developed by scientists for maximizing the plants natural tendency to produce **Cannabinoids** Which can support our own " **Endocannabinoid** " System and positively influencing this Amazing system which every human being has as its principal controller.

i-Sol is to be administered with irrigation water that may or may not be pH tested. The volume of i-SoL may vary from as low as 10 litres/acre/irrigation cycle to as much as 60 litres/acre/irrigation cycles (this is dependent on plants' nutritional requirements, genotype, soil type, etc.).

Furthermore, **i-SoL** is designed to provide nutrients to plants in a bioavailable form that is expected to bring about significant transformations in plants' growth and development while it concurrently minimizes pests and diseases which negatively impact plants growth. For example, i-SoL will help to control the Nitrate-Nitrogen below 600 ppm in the plant petiole, which will enhance the plant growth in more than one way. It provides all nutrients – macro, micro, trace and essential elements all the time, to avoid plant deficiencies.

THE i-SOL

(See Reference # 1- Flow Chart)

i-SoL Microbial Technology

Plants & Microbes (similarly Animals & Microbes) have evolved alongside each other since the beginning of time. Humans have roughly about 30 Trillion cells while the microbes living on each body amount to about 100 Trillion units.

When the relationship between the Host Cells (say plants) and Microbes is beneficial to each other, then this relationship between the Host Cells and Microbes is called a Symbiotic one and the microbes "Simbionts".

iSoL's Technology circumscribe this most important relationship and thus promote and foster this event which has been taking place since the beginning of time. **Refer to Reference 1 (Flow chart)** and note the iSoL program which provides an inoculant to the soil, promoting the growth of beneficial microbes through a process known as Quorum Sensing **(Ref. 8)**

iSoL also incorporates the help of the microbes present in The Phytosphere and by extension The Phyllosphere, The Rhizosphere and The Endosphere**. (Ref 6)** .

When the world is embarking into the science of Medicinal Cannabis then surely since we are dealing with a Biological Medicine & thus the most Natural and Time Proven systems must be adhered to in order to produce the most beneficial Flowers and Oils.

iSol Delivers!

PURPOSE OF TRIAL

The purpose of this trial is to investigate the effect of i-Sol using H2K Agro technologies in facilitating farmers to improve their fertilization use efficiency (FUE) for plants growth and development in their medicinal cannabis cultivation operation.

SIGNIFICANCE OF i-SOL TRIAL

It is hoped that the results of this trial will aid farmers to: a) eliminate cumbersome fertilization regimes by simplifying their fertilization process through incorporating i-SoL using H2K Agro technologies in their respective farming system; and b) increase their fertilizer use efficiency inputs options, that is, instead of Water-soluble fertilizers, farmers may use Di-Ammonium Phosphate, urea, Calcium Nitrate etc. Similarly, instead of chelated micronutrients, farmer may use sulphates of *Zinc, Iron, Copper and Manganese.*

TRIAL PARTICIPANT AND LOCATION

The participant selected is a Rastafarian and small traditional ganja farmer who cultivates for sacramental purposes and has over 10 years experience cultivating cannabis.

The farm is located in St. Catherine, Jamaica.

OBJECTIVES OF THE I-SOL TRIAL

GENERAL OBJECTIVES

To demonstrate the efficacy i-SOL using H2K Agro technologies for the cultivation of medicinal cannabis in shade house conditions[+1] using growbags[+2] along with weed-mats[+3].

SPECIFIC OBJECTIVES

Farmers will be able to:

1. Prepare field/grow medium prior to planting using the H2K Agro package of practice for soil and grow medium preparation.
2. Utilise the **H2K Agro Nutrient Management program** for the treatment of seeds, seedlings and grow medium for setting seeds or clones for the cultivation of medicinal marijuana.
3. Use **H2K Agro pest and disease package of practice** in the cultivation of medicinal marijuana.
4. Compare conventional techniques to the H2K Agro technology for setting seeds or clones to the control area of the nursery when cultivating medical marijuana.
5. Apply and compare conventional techniques to the H2K Agro techniques for cultivating medicinal marijuana to the control area of the field/grow house.

[+1] Shade house, in this instance, is defined as a growing facility which seeks to only cover the top of plants using greenhouse plastic while leaving the sides of same open. The facility is geared towards mitigating against the heavy rainfall that may otherwise negatively impact the buds of the plants.

[+2] Grow-bags that were used is five gallons

[+3] Weed-mats were placed on the floor of the grow house with the view to eliminate weeding by the farmer, manage soil pathogens and diseases whilst maintaining a cleaner & sterile environment.

i-SOL TRIAL DESIGN

Experiment: H2K AGRO Nursery IPOP	**Control: CONVENTIONAL**
➢ Select seeds / strain for planting and treat planting medium and seeds using the H2K Nursery Program ➢ (see attached)	➢ Select seeds / strains for planting
➢ Apply H2K Agro Nursery IPOP (see attached) to planting bags	➢ Apply conventional seed/ clone treatment and set in planting bags.
➢ Water as per nursery IPOP recommendation	➢ Water as per conventional recommendation
➢ Collect data to include: • Number of days to root development • Total number of developed clones • Number of days for complete root development	➢ Collect data to include: • Number of days to development • Total number of developed clones • Number of days for complete root development

Note: Cannabis will be planted using clones taken from plants during their vegetative stage. The following outlines the plants development and growth pattern:

CLONES FROM BINS:

STRAINS	No. of CLONES	MORTALITY	OBSERVATIONS
Silver Cure (SC)	62	Zero	Plants appeared healthy
Blue Vision (BV)	100	Zero	
Mercy	18	Zero	
Ark	128	Zero	

CLONE SEQUENCE OF STEPS:

1. Clones were selected from plants already established in the fields (no specific mother plants was identified)
2. The clones were placed in the clone bins inside the nursery facility (aero-ponics system) for a maximum of two weeks
3. The clones were afterwards transplanted into small 3" pots consisting of top soil and potted mix (mix ratio consisted of 70% top soil and 30% potted mix)
4. The clones transplanted were placed H2K Agro Nursery Programme for a maximum of two weeks and then transplanted to larger grow bags (5gal grow bags)
5. Lights (15W LED bulbs) were placed approximately 24 inches above the plants in the nursery
6. The soil in the grow bags were treated using H2K Agro soil treatment for pathogens and other nematodes (See appendix XX) for a period of two weeks.

   ***N.B. No i-SOL application was done during this period**.*

Pre-Flowering Phase or Stretch Period

The i-SoL program commenced about two weeks after plants were placed in the 5gal grow bags. The plants were monitored for approximately two weeks (or 10-14 days) as plants tend to grow dramatically or show lack of growth during this period. The observations pertaining to the plants' growth and development were recorded.

*N.B. i-SoL was administered and adjusted according to the plants' nutrient requirement.

GROW HOUSE:

The plants were transplanted from 3inch cups to 5gallon grow bags and then placed in a Shade house grow facility to flower. The grow house facility was designed to provide shade for the plants during the vegetative phase and most importantly the flowering (bud development) phase. Excessive moisture and rain are known to negatively impact the quality of the bud during flowering and in many instances cause total bud loss. The grow house facility was designed with the sides completely open with greenhouse plastic on top and a ground cover running along the entire base of the greenhouse at a height of approximately 3 feet (see diagram).

The following table list a few number of Material Inputs for the Grow House Construction and layout:

QUANTITY	DESCRIPTION
2	**16mm hose (330ft)**
2	**40mm hose**
2	**50mm hose**
1	**32mm hose**
32	**16mm lock offs**
200	**2-way complete emitters**
2 rolls	**Greenhouse plastic**
1	**Venturi Injector**
8	**Solar Lights**
As required	**Weed Mats**

2 TRIAL INSPECTIONS

2.1 Timing of inspections

Inspections were arranged during the projected crop cycle that was approximately three (3) months, commencing from September 2019 to December 2019, to examine changes in plants growth and development patterns due to incorporating i-Sol using H2K Agro technologies to improve fertilization use efficiency or to address any concerns relating to the grow area facility.

Scheduled and random inspections were conducted each day for approximately 90 days by H2K Agro Technical Representatives and the respective Farm personnel.

Observations from inspection visits involving excess rainfall or any other anomaly that brought about any changes in plants growth and development that were positive, negative or normal during the trial were documented. Additionally, there were inspections done to monitor the plant population and uniformity of growth during the shorter and colder days.

Inspections for any scheduled or unscheduled applications of insecticide and fungicide and i-SOL fertilization were done. The plants were inspected to assess the effectiveness of i-SOL treatment, pest management treatment, plant growth regulator and fertilizer applications and the uniformity of growth and development.

The inspections assisted to identify plants that may have experienced any type of stress that require immediate attention and to observe any defects in the i-Sol trial as well as pest or disease prevention and control monitoring.

2.2 Trial Inspection Merits & Limitations

In order to effectively conduct the trial, a list of requirements which included access to the farm property and access to relevant plant and plant maintenance information were requested from the farmer prior to the commencement and during the trial. The following are the merits and limitations regarding the trial recorded by the H2K Agro Representatives:

Merits

1. There was adequate access to the trial site;
2. Access to information pertaining to the site location, the area for the layout of trials within the grow house was provided;
3. The Technical representative(s) had total access to information pertaining to the farmer's pest and disease prevention and control products as well as application methods, as requested,
4. Access to information regarding fertilization products as well as methods of application, was provided by the farmer;
5. Non-routine assessments required to establish the validity of the trial (for example population counts) was facilitated by the Farm administrative representative.

6. The trials inspection provided an opportunity for feed-back to the trial protocol, plants, applications, etc. and H2K Agro representatives were able to report any highlights or issues to the other team members consideration of amendments the protocol.
7. Collaborative action plans derived from consultations with the H2K Agro representative were implemented and monitored by the respective farm personnel. In particular, it is important that any requirement to shorten plots is undertaken and that missing values are returned on any plots which have been rejected.

Limitation

There was limited access to information pertaining to the plants' genotype, phenotype, and other pertinent data such as the plants' characteristics and strain varieties that were to be used within the trial;

2.3 TRIAL REPORING FORMAT

The H2K Agro Representative(s) recorded findings on the standard **i-SOL Inspection Guidelines Form** (see Appendix XX).

Additionally, the representative discussed the state of the trial with the Trial manager/sponsor(s) during the inspection visits or, if unaccompanied at the trial inspection, via email/WhatsApp using both photos and videos, shortly after or during each visit.

If any non-routine action were required, a plan of action was developed and the details were included in the report. The Trial Manager and the H2K Agro representatives were responsible for monitoring the implementation of the action plan developed.

Individual reports were posted within the WhatsApp group which included of all relevant stakeholder of H2K Agro Team. It was the responsibility of all relevant personnel to read the reports and to provide feedback, recommendations pertaining the implementation of the agreed course of action.

A final report will be submitted after the cannabis product is reaped, dried, weighed and processed to the Managing Director of H2K Agro Jamaica.

2.4 i-SOL Inspection Guidelines Form

An i-SOL Inspection Guidelines Form was developed to assist the Agro Representatives to assess the trial. The following guideline range of questions are can be expanded, if deemed necessary (do these meet those given in the protocol if defined and/or appropriate to the trial crop?):

Sowing date Soil type	a) Ans.: b)
Suitability of trial patch position in the field	a) Is there water nearby that might lead to water-logging? Ans.: b) Is the grow-house steeply sloping or flat? Ans.: c) Are there features such as trees and hedgerows that might give rise to pest problems or effects such as shading or wind effects that might cause abnormal results? Ans.: d) Is there inoculated disease plots nearby that might give abnormal disease and pest pressure? Ans.: e) Is the site free of problems from previous cropping e.g. herbicide effects? Ans.:
Border and field operations	a) Was a border used? If so: is the inter-plot border width ≥ to the trial plot-width? Ans.: b) Are there any interruptions (separating crop) used in the field? Ans.: c) Are there consistent distances between neighbouring rows and inter-plot gaps? Ans.:
Field layout to	a) Were there any changes to the original field layout plan and if so,

plan?	have these changes been relayed to the primary technical personnel? Ans.:
Plant population	a) Does the plant population appear to be correct? Ans.:
Are there buffers?	a) Have buffers (i.e. between various varieties/strains) been placed as required? Ans.:
Weed control	a) What is the size and population of weeds? Ans.: b) Have they been sprayed and, if so, which herbicide was used? Ans.: c) Are weeds competing or likely to compete with the crop? Ans.: d) Was alternative weed control mechanism used and if so which type(s)? Ans.: e) How effective were the alternative weed control mechanism? Ans.:
Pest control	a) Is there any damage by pests such as insects, birds, rodents, ants? Ans.: b) Was the crop significantly damaged and did it recover? Ans.:
Disease control	a) If the trial should have been sprayed, does it appear to have been effective (is the level of any disease >10% in any plot?) Ans.: b) If there is an untreated trial in the field, compare the levels of disease between the treated and untreated plots. Ans.:

Uniformity	a) Indicate whether the trial is growing uniformly Ans.: b) Indicate if there is any difference in growth between the control and treated plots. Ans.: c) Indicate if there is a serious problem with specific plots (note which plots are affected). Ans.: d) Indicate if there is a problem with individual varieties/strains (note which are affected and inform the plant breeder/agent). Ans.: e) If there is any plant development variances indicate if it appears to be caused by differences in soil fertility, environmental effects or protocol treatments rather than plant variety. Ans.:
Any conflict of protocol?	a) Does the trial meet the protocol specification for rotation, sowing date or any other definition? Ans.: b) Are the harvestable plot dimensions acceptable? Ans.:

Is the trial acceptable? The trial will be rated as follows:

Good:	Evenly established well-grown trial that meets protocol requirements.
Satisfactory:	Some problems, such as small areas of poor growth, missing sections or missing rows within the treated plot. Some plots or parts of plot may need to be excluded but overall trials should provide satisfactory data.
Of concern:	Larger areas of poor establishment or growth, affecting replicates. Disease levels >10% in treated sections of the trial. A second trial Inspection may be carried out to assess subsequent development. Requires careful validation at harvest.
Reject:	Problems cannot be resolved.

2.5 Completed i-Sol Inspection Guideline Form:

The Agro Reps assessed the trial using the aforementioned guidelines and recorded the following findings:

Sowing date Soil type	c) Ans.: The most appropriate time for sowing cannabis is during the spring period. The period that sowing took place was considered to be winter and the protocol used by H2K Agro was tested during this period. d) Ans.: Soil type was sandy loam. H2K Agros' iSOL protocol along with its suite of bio-stimulants would be used to create the soil micro-organism structure (create super-soil). The soil was uniform in terms of texture, depth, structure and drainage
Suitability of trial patch position in the field	f) Is there water nearby that might lead to water-logging? Ans.: No. The plants were planted out in grow bags using drip irrigation system g) Is the grow-house steeply sloping or flat? Ans.: Gentle slope h) Are there features such as trees and hedgerows that might give rise to pest problems or effects such as shading or wind effects that might cause abnormal results? Ans.: Yes! Located to the extreme rear of the grow-house was a fruit tree (mango) that was overgrown and was touching the house at some point. This tree became a concern as it caused significant amounts of shading, restriction of wind and a heaven for many of the pest, diseases and fungal concerns (see appendix XX) that we encountered during the trial. i) Is there inoculated disease plots nearby that might give abnormal disease and pest pressure? Ans.: Yes! Located to the immediate left of the grow-house (standing at the main entrance) was a plot of land approximately 3600sqft that was overgrown with shrubs and weeds. The area was originally slated to be planted out but that did not materialize. This area became a heaven for many of the pest and diseases (see appendix XX) that we encountered during the trial. j) Is the site free of problems from previous cropping e.g. herbicide effects? Ans.: Yes. No herbicides were used to clear any sections of the area or for

	weed control. The use of weed whackers and weed-mats were used to manage same.
Border and field operations	d) Was a border used? If so: is the inter-plot border width ≥ to the trial plot-width? Ans.: No inter-plot border was required. e) Are there any interruptions (separating crop) used in the field? Ans.: Yes. Shade cloth was used to define the grow space f) Are there consistent distances between neighbouring rows and inter-plot gaps? Ans.: Yes. Row distances were set at approximately three(3) feet from centre
Field layout to plan?	b) Were there any changes to the original field layout plan and if so, have these changes been relayed to the primary technical personnel? Ans.: No, there was no changes to the field layout plan
Plant population	b) Does the plant population appear to be correct? Ans.: Yes
Are there buffers?	b) Have buffers (i.e. between various varieties/strains) been placed as required? Ans. No. It was not deemed necessary
Weed control	f) What is the size and population of weeds? Ans. Approximately 3600sqft. plot located immediately beside the grow-house g) Have they been sprayed and, if so, which herbicide was used? Ans.: No. Weed-whackers and weed-mats were used for the control of weeds h) Are weeds competing or likely to compete with the crop? Ans.: No. Plants were set in grow-bags which allowed for minimal amount of weeds i) Was alternative weed control mechanism used and if so which type(s)? Ans.: Yes, hand weeding was done during routine inspection j) How effective were the alternative weed control mechanism? Ans.: Very effective management of the weed was realized as the plants

	were set in bags, used weed-mats, and were hand weeded
Pest control	c) Is there any damage by pests such as insects, birds, rodents, ants? Ans.: The incident of pest such as birds, rodents and ants was not prevalent. However, the incidents of other pest was quiet common (see appendix XX) d) Was the crop significantly damaged and did it recover? Ans.: Crop was not significantly damaged as the cycle of spray relating to pest management proved to be effective
Disease control	c) If the trial should have been sprayed, does it appear to have been effective (is the level of any disease >10% in any plot?) Ans.: Yes. The levels of disease were significantly lower than 10% within the treated area. Spray regime was more for preventative based on the proximity of location of the controlled area as well as the overgrown area located to the left of the grow-house versus the treated section. d) If there is an untreated trial in the field, compare the levels of disease between the treated and untreated plots. Ans.: Located immediately (8ft.) across from the treated section was a plot or other grow-house that housed over 300 plants. The pest levels within that space were significantly high, greater than 25%. The spray regime that was employed in that section was more for corrective rather than preventative.
Uniformity	f) Indicate whether the trial is growing uniformly Ans.: Yes g) Indicate if there is any difference in growth between the control and treated plots. Ans.: The controlled section was planted out approximately six weeks prior to the treated however, the treated was harvested two weeks after the controlled at similar heights and similar weights h) Indicate if there is a serious problem with specific plots (note which plots are affected). Ans.: No, there were no serious problem with any specific plots or part thereof i) Indicate if there is a problem with individual varieties/strains (note which are

	affected and inform the plant breeder/agent). Ans.: Yes. The Ark which was a fairly new strain was introduced in the initial trial. However, after observing the plant for two weeks and comparing it with the other plants, it was noted that enough data regarding the plant genotype was not available to make an adjustment in the feeding and spraying protocol at this time. This plant was discontinued from the trials. j) If there is any plant development variances indicate if it appears to be caused by differences in soil fertility, environmental effects or protocol treatments rather than plant variety. Ans.: There were no plant development variances outside of the normative. All variances was directly related to plant variety
Any conflict of protocol?	c) Does the trial meet the protocol specification for rotation, sowing date or any other definition? Ans.: Yes d) Are the harvestable plot dimensions acceptable? Ans.: Yes

Is the trial acceptable? The trial will be rated as follows:

Good:	Evenly established well-grown trial that meets protocol requirements.
Satisfactory:	Some problems, such as small areas of poor growth, missing sections or missing rows within the treated plot. Some plots or parts of plot may need to be excluded but overall trials should provide satisfactory data.
Of concern:	Larger areas of poor establishment or growth, affecting replicates. Disease levels >10% in treated sections of the trial. A second trial Inspection may be carried out to assess subsequent development. Requires careful validation at harvest.
Reject:	Problems cannot be resolved.

3. Post-harvest statistical and technical validation of data

3.1. Preliminary validation of data - individual trials

Preliminary validation of data was undertaken by the trial manager responsible for the trial. Checks included but not limited to:

- the correct character or names and units were used for each plant variety
- the trial ID is shown
- the minimum and maximum values recorded are sensible
- the date and growth stage were recorded

These checks were also conducted by the technical Officer.

3.2. Non-yield data

Disease data:

- Was the record taken at the correct time, as defined in the protocol?

  Ans. Yes. The major disease faced during the trial was a mold issue. This was a result of inappropriate drying and curing facility at the time of harvest.

- Was the pattern and level of disease recorded unexpected?

  Ans. No; given the aforementioned condition that was experienced it was recognized that issues of this nature and its pattern was to be expected. It should however, be noted that the rapid growth of mold was not expected.

- If the disease recorded is in treated trial were the levels >5% or >10% in any plot?

  Ans. Neither; the levels were less than 5% during the growing period. The issue of mold was seen mainly at post harvest.

Agronomic data:

- Was the pattern and level of the recorded characteristic unexpected?

  Ans. Yes! Based on the local experiences for the growing of cannabis the yield from the trials was noted to have increased. The usual manner of growing was to plant directly in soil however, with the use of grow bags it was touted that plants would only grow a few feet (just about 2ft.) this was not the case however. Plants got to as tall as 6ft. and as wide as 4ft.

The yield info will also highlight additional data

3.3. Yield data

The plant yield was considered the most important validation character because its a composite indicator of the overall quality of data from the trial and therefore requires utmost scrutiny.

- Are yield and dry matter data both available?

  Ans. Yes
- Was a moisture analyser used for the trial?

  Ans. No
- Were plot dry matter values within a reasonable range which is ≥ 56.7g (2oz) per plant? (dependent on plant variety/strain)

  Ans. Yes
- Have all strains identified at post harvest as being of concern adjusted for size or omitted?

  Ans. Yes
- Is the trial overall mean in the following expected ranges for crops (varieties/strains) planted at this season? If not, is it between 75% and 100% of the mean for the trial series for that period of year?

  Ans. Yes
- If a wet or dry matter assessment is lost, can it reliably be estimated from the remaining observation(s)? If so, its value may be replaced by an estimated value, e.g. the mean of the other assessments.

  Ans. Yes! Strains demonstrated a reasonable consistency in terms of growth and development.

3.4. Data ranges

Most of the data received at harvest will be within the ranges shown below. If the data received are outside of these ranges, they may be corrected but should be queried.

Cannabis		
Variety/Strain	Wet matter (weight at reaping) Kg (lbs.)	Dry matter (weight after drying) Kg (lbs.)

EXPECTED Trial Data	**Control**	**Treated by H2K Agro**
Number of rows planted		30
Number of plants per row		10
Total number of plants		300
Expected Total yield Wet Kg (lbs.)	[@ ___lbs. per plant]	[600lbs @ 2lbs. per plant]
Expected Total yield Dry Kg (lbs.)	[@ ___% of wet yield]	[90lbs. @ 15% of wet yield]
Expected yield per row Wet Kg (lbs.)		20lbs.
Expected yield per row Dry kg (lbs.)		3lbs.
Expected yield per plant Wet kg (lbs.)		2lbs.
Expected yield per plant Dry Kg (lbs.)		4.8oz

ACTUALS

Trial Data	Control	Treated by H2K Agro
Number of rows planted		28
Number of plants per row		11
Total number of plants per section		294
Total yield Wet lbs.		196
Average yield per row Wet lbs.		7lbs
Average yield per row Dry lbs.		1.05lbs
Average yield per plant Wet lbs.		1.7oz
Average yield per plant Dry lbs.		4oz

NOTES

1. Total number of rows planted was reduced to 28
2. Total number of plants per row increased to 11
3. Total number of plants was 308 however, approximately 14(4.5%) plants died or was removed from the trial
4. The information for the control section was not available at the time of this report

3.5. *Analysis of variance statistics:*

Check for variance accounted for by the replicates and by the blocking for incomplete strains. Investigate any large differences i.e. more than +/- 0.5

NOTES: Variances were negligible

Residuals

A residual is the strain yield with the variety and replicate effects removed. Check for any values which may indicate problems with individual strains or sets of strains. Using these residuals, strain yields are flagged for attention as follows:

?	Moderately up or down
X	Worth looking at
*	Should be checked

Check the residuals for any large, flagged values, which may indicate problems. Do high residuals appear in patches or individual strains? The valuator will decide, in consultation with the trial manager, if they are typical

occurrence and should be excluded from the summary report or reflect an aspect of the strain's performance that is valid for assessment.

Example reasons for high variation:

Soil effects	Shedding / foliage loss	Equipment faults
Pest damage	Sprouting	Human error
Disease	Combine losses	Chance
Weather		Acts of God

Submitted data may offer a likely explanation of the 'odd' results or they may correspond to notes taken earlier either by the trial manager or agro rep. If no obvious likely reason can be found, the trial manager should be consulted to see whether any factor has been missed which, if rectified, might increase the accuracy of the trial.

NOTES:

However, for all intent and purpose, a number of the parameters were not determined as there are insufficient data available for each strain from previous planting.

SUMMARY OF TRIAL FINDINGS

The balance of judgement is to accept trial data unless there is a clear reason to reject same.

Trials will not normally be rejected because they appear to be different to others in the series but the trial manager and clinical research officer will attempt to explain why such differences may have occurred.

Any plant breeder/agent or responsible officer who is concerned over any trial data should advise the Trial Manager or Clinical Research Officer at H2K Agro in writing immediately.

Appendix 1a Inspection report form (field inspection)

Recommended List trial validation report

Crop		
Year		
Operator code		
Trial Code		
Treatment		
Type		
	TREATED	CONTROL
Time of sowing requested / actual		
Soil type requested / actual		
Rotation requested / actual		
Date of Inspection		
Name of trial Inspector		
Name of trial contractor present		
Does contractor agree with report?		

Management & husbandry checklist (assume all answers are 'YES' unless a comment is made):

Does the trial meet protocol specifications (e.g. soil type)?	
Is the field or grow area suitable?	
Is the trial in a suitable position in the grow area or field?	
Is grow bag preparation & soil of a good standard?	
Are the harvest plot dimensions OK?	
Have buffers been sown as required?	
Is the plant population OK?	
Is weed control acceptable?	
Is the trial free of pest damage?	
If a fungicide required, has it been effective?	

Current state of trial

Is trial uniformity acceptable?		
Is rep uniformity acceptable?		
Are individual plots free of problems?		
Are all varieties free of problems?		
Is the trial acceptable on the day of the visit?		
State of trial on day of trial inspection		
Summary inspection report including reasons for concern or rejection		

Post harvest validation – Cannabis

Crop		
Year		
Operator code		
Trial Code		
Treatment		
Trial series		
Type		
Site		
Is the plot length/width constant?		
Have actions suggested in the trial report been implemented?		
Was the harvesting method appropriate?*		
Have moistures been determined?		
Is the yield / gross output within a sensible range?		
Is the trial free from bud loss etc?		
Is the trial free of significant disease?		
Is the trial free of significant pest?		

Statistical Analyses	
Notes:	
FINAL ANALYSIS	
Yield corrected for DM / MC%	CV% =
Dry matter (DM)% or moisture content (MC)%	Mean DM% for trial
	CV% =
Gross Output*	CV% =

Final trial validation		
Is the trial valid?		
Reason if rejected		
Is the non-yield data valid?		
Validator's initials		
Date of validation		

Appendix 1:

Prepare Field/ Grow Medium

Each soil or grow medium has its own unique issues and it is often a challenge for the farmers to determine the issues that are associated with their respective soil type prior to planting without conducting a soil test. Moreover, these test serves only to determine which nutrients the soil require at time of planting. However, the issues of soil pest, disease and nematodes are often overlooked and it's after the crop is at the flowering phase that a number of these issues begin to appear. The solutions at this time are often limited or non-existent at this phase of the crop cycle which is either at or close to harvest phase for the cannabis flower.

The cannabis plant is not that different from other plants, as we have seen ants, plant cutters, termites (a.k.a. white ants) and many other issues which invade and destroy other plant crops close to the time of harvest.

H2K Agro has developed a protocol for soil preparation prior to planting, during plant growth and development, and close to or immediately prior to the harvest phases that has guaranteed successful harvesting. Table1 outlines the application that is recommended per acre:

Table1 Per acre

PRODUCT	QUANTITY (ml)	APPLICATION
D'nemo	300	Soil
Wholesome	300	Soil
Strike	300	Soil

Assumptions:

1. Number of cannabis plants per acre is 2000
2. 200litres of water will be used to mix products and applied to one acre per treatment
3. Farmer will adjust rates as guided by their H2K Agro representative per field

Table 2 outlines the actual that were used during the trial for 300 plants

Table2 308 Plants

PRODUCT	QUANTITY (ml)	APPLICATION
D'nemo	40	Soil
Wholesome	40	Soil
Strike	N/A	Soil

Note:

a) Strike was not used at this time as there was no evident of ant issues

b) 40ml of each product was used to 30ltrs of water

c) Application was made using a knapsack sprayer

d) Application was made eight days after plants were established in 5gal bags

Secondary Culture

Secondary Culture (SC) is inoculums of microbes that are considered to be GRAS (generally recognized as safe). These microbes are brewed to multiply into their billions and then released into the soil to provide the kind of microbial stimulation required for the growing and development of any plant. SC is the primary key that has given H2K Agro the success that is needed to grow medicinal cannabis.

For 300 plants $1/6^{th}$ of the SC was brewed for the treatment of the plants during the trials see table below:

Table 3: Secondary Culture

PRODUCT	QUANTITY
Innocare	40ml
I-surge	8ml
Molasses	1ltr.
Water	33ltrs.

Summary of trial Information ISOL

The ISOL program commenced in October 2019 and continued for approximately 12 weeks. 308 clones were planted from various strains; namely: Silver Cure, Mercy, Blue Vision and Ark. They were planted under a shade house in bags using the venturi system for feeding and irrigation for watering. Below is a table showing the application made per week per plant. Plants were watered everyday and treatments and feeding were done at least once per week (see appendix XX for detail program).

Two weeks prior to the commencement of the i-SOL program (see table below), soil treatment was administered to the grow bags see table below

Soil Treatment Table2 300 Plants

PRODUCT	QUANTITY (ml)	APPLICATION
D'nemo	40	Soil
Wholesome	40	Soil
Strike	N/A	Soil

Notes:

a) Strike was not used at this time as there was no evident of ant issues

b) 40ml of each product was used to 30ltrs of water

c) Application was made using a knapsack sprayer

d) Application was made eight days after plants were established in 5gal bags

Cannabis iSOL Protocol

Application	12 Weeks (3 months) per plant (After Grow House)											
Week	1	2	3	4	5	6	7	8	9	10	11	12
i-Sol, ml	25	25	37.5	37.5	50	50	50	50	62.5	62.5	62.5	62.5
Secondary Culture, ml		25				25				25		
Foliar i-Sol, ml			10	10	10	10	10	10	10	10	10	10

The application of i-SOL was increased during the third week of the program. This was due to the noted rate of development and nutrient consumption of the plants (it must be noted that this was two weeks ahead of schedule increase).

The average length of the plants at transplant was approximately 8inches. At the end of the fourth week after transplanting, the length ranges between 20-35 inches. The size varies based on the strain. The Silver Cure ranges between 33-35inches and the others were between 20-32inches. The plants grew at an average of approximately 12 inches. At the end of the seventh week however, the plants were between 3-5ft tall, representing an average growth of 1.5inches per day.

Photo 1

Beneficial & Non-beneficial Bugs

There was evidence of both beneficial and non-beneficial insects/pests present in the garden. For example, frogs and Aphids (see appendix XXX for detail list and treatment). Frogs and wasp proved to be beneficial to the garden because they feed on many pests such as, bugs, caterpillars, and other pests. Some other insects while they were nuisance provided some benefits. Due to the presence of Aphids, beneficial insects were attracted to the garden such as lady beetles. The use of H2K Agro pest management program was implemented on a few occasion and only when deemed necessary. The products used were 100% organic and it encouraged the beneficial bugs in the garden.

Picture showing lady beetle

Picture showing frog in the garden

Soil Management & Treatment

The plants in the grow bags had to be topped-up on two separate occasions with soil. As the plants grew they developed new roots, these roots are referred to as ‘adventitious roots’. Adventitious roots are roots which can sprout from the aerial parts of the plant, such as the stem, and grow towards the substrate. Adventitious roots are less common and only grow in environments with high and steady humidity levels.

Our soil treatment, which included significant GRAS microbial applications, using Inno-care and Eco-Boost, aided the substrate that the plants were in to become a well balance growing environment. The plants also had significant amount of flora growth.

'Pruning' and 'Lollipoping' were two techniques which were employed in the growing process to train the plants. However, when combined with the Secondary Culture applications it was noted that the plants responded with significant foliage growth and development. These techniques and processes allow the plants to redirect their energy and resources to provide quality buds and better air flow in the grow house thus keeping the plants vibrant and healthy. Due to the environment that was created for the plants new leaves are seen within two days of pruning.

Picture showing root growth

Picture showing foliar development

Trichomes (buds with oils)

Two weeks prior to harvest, the i-SOL was stopped, and the plants received a reduce amount of water. The harvest was done over a three-day period. Each plant was cut at the trunk/stem. Observation of the trichome via the microscope indicated that the plants were either ready or close to ready for harvesting (see pictures below).

Pictures showing Trichomes (buds with oils) utilizing iSoL

Certificate of Analysis
H2K Agro Cannabis Extract / Buds/ Terpene screen analysis

UNIVERSITY OF THE WEST INDIES
MONA, KINGSTON 7, JAMAICA

CARITOX

CARIBBEAN TOXICOLOGY UNIT
DEPARTMENT OF BASIC MEDICAL SCIENCES
Tel: (876) 977-6531; Fax: (876) 977-7852 Cell: (876) 327-8091

REPORT No. RCTG28_190702-02 REPORT DATE: July 2, 2019

Carmen Lynch
H2K Agro Jamaica
39 Hagley Park Road
Kgn 10
(876)-906-9477
h2kagrdja@gmail.com

Certificate of Analysis

This certificate/report is a correct record of the measurements and observations made. The certificate/report is intended for the private information of those for whom the work was done and must not be used in whole or part in any other way except with the written approval of the Head of Caritox, UWI.

Test: Cannabinoid Analysis (Panel of 9)	Trace Code: 'LBO'	Page 1/1
	Date submitted: June 6, 2019 Date Analysed: June 30-July 02, 2019	
Client: H2K Agro Jamaica	Lab no.: CT19G0028_D	
Product: Cannabis Extract	Test Method: 1. Cannabinoid analysis by HPLC **(CT WI # QA 40)**	
Limit of Detection (LOD) = 0.01%w/w	Storage conditions: Freezer	

RESULTS: Cannabinoid analysis for CT19G0028_D ('LBO')

Cannabinoids	(mg/g)	%w/w
Δ-9-THC	515.310	51.531±1.738
THCa	24.268	2.427±1.073
$\%THC_{Total}$		53.659±0.797
CBD	3.212	0.321±0.078
CBDa	0.830	0.083±0.0.117
$\%CBD_{Total}$		0.394±0.181
CBN	28.473	2.847±0.054
CBDV	ND	ND
CBC	3.413	0.341±0.136
CBG	23.628	2.363±0.167
CBGa	ND	ND
$\%CBG_{Total}$		2.363±0.167

Remarks: – Δ-9-THC - Delta-9-Tetrahydrocannabinol; **CBD**- Cannabidiol; **CBN**-Cannabinol; THCa- Tetrahydrocannabinolic acid; **CBDa**-Cannabidiolic Acid; **CBDV**- Cannabidivarin; **CBG**- Cannabigerol; **CBGa**-Cannabigerolic acid; **ND**-not detected; $\%THC_{Total}$ =%THC + (%THCa x 0.877); $\%CBD_{Total}$ =%CBD + (%CBDa x 0.877); $\%CBG_{Total}$ = % CBG + (% CBGa x 0.878)

END OF REPORT

Signed: ..... Date: 5/7/2019
Tainia Taylor
(Laboratory Analyst)

Approved: ..... Date: 5/7/2019
Carole Lindsay
(Chief Analyst)

UNIVERSITY OF THE WEST INDIES
MONA, KINGSTON 7, JAMAICA

CARITOX
CARIBBEAN TOXICOLOGY UNIT
DEPARTMENT OF BASIC MEDICAL SCIENCES
Tel: (876) 977-6531; Fax: (876) 977-7852 Cell: (876) 327-8091

REPORT No. RCTG28_190702-03 REPORT DATE: July 2, 2019

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Certificate of Analysis

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Test: Cannabinoid Analysis (Panel of 9)	Trace Code: 'Silva Cure'	Page 1/1
	Date submitted: June 6, 2019 Date Analysed: June 29-July 01, 2019	
Client: H2K Agro Jamaica	Lab no.: CT19G0028_C	
Product: Dried Cannabis Buds	Test Method: 1. Cannabinoid analysis by HPLC (CT WI # QA 40)	
Limit of Detection (LOD) = 0.01%w/w	Storage conditions: Freezer	

RESULTS: Cannabinoid analysis for CT19G0028_C ('Silva Cure')

Cannabinoids	(mg/g)	%w/w
Δ-9-THC	1.4	0.14±0.03
THCa	4.1	0.41
$\%THC_{Total}$		0.49±0.03
CBD	31.1	3.1±0.9
CBDa	145.7	14.6±4.9
$\%CBD_{Total}$		15.9±0.8
CBN	ND	ND
CBDV	ND	ND
CBC	1.7	0.17±0.04
CBG	0.53	0.05±0.01
CBGa	1.8	0.18±0.04
$\%CBG_{Total}$		0.2±0.06

Remarks: – **Δ-9-THC** - Delta-9-Tetrahydrocannabinol; **CBD**- Cannabidiol; **CBN**-Cannabinol; THCa- Tetrahydrocannabinolic acid; **CBDa**-Cannabidiolic Acid; **CBDV**- Cannabidivarin; **CBG**- Cannabigerol; **CBGa**-Cannabigerolic acid; **ND**-not detected; $\%THC_{Total}$ =%THC + (%THCa x 0.877); $\%CBD_{Total}$ =%CBD + (%CBDa x 0.877); $\%CBG_{Total}$ = % CBG + (% CBGa x 0.878)

END OF REPORT

UNIVERSITY OF THE WEST INDIES
MONA, KINGSTON 7, JAMAICA

CARITOX

CARIBBEAN TOXICOLOGY UNIT
DEPARTMENT OF BASIC MEDICAL SCIENCES
Tel: (876) 977-6531; Fax: (876) 977-7852 Cell: (876) 327-8091

Report No.: RCTG12_190812_01 **REPORT DATE:** August 12, 2019

Carmen Lynch
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(876)-906-9477
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Certificate of Analysis

This certificate/report is a correct record of the measurements and observations made. The certificate/report is intended for the private information of those for whom the work was done and must not be used in whole or part in any other way except with the written approval of the Head of Caritox, UWI.		
Test: Terpene Screen analysis	Trace Code: 'Silva Cure'	Page 1/6
	Date submitted: June 6, 2019 Date Analysed: June 29-July 01; July 30, 2019	
Client: H2K Agro Jamaica	Lab no.: CT18G0028_A	
Product: Plant material	Test Method : 1. Profiling of Terpenes for various types of Plants (**CT WI # QA 16**)	
	Storage conditions: Refrigerate	

Results:

Terpene Screening reports for CT19G0028_A

The terpenes identified in the sample are presented in tables below. They are listed in descending order of Area percent.

Certificate of Analysis

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Test: Terpene Screen analysis	Trace Code: 'Silva Cure'	Page 2/6
	Date submitted: June 6, 2019 Date Analysed: June 29-July 01; July 30, 2019	
Client: H2K Agro Jamaica	Lab no.: CT18G0028_A	
Product: Plant material	Storage: Refrigerate	
	Test Method : 1. Profiling of Terpenes for various types of Plants **(CT WI # QA 16)**	

Terpenes identified in CT19G0028_A

Compound Identified	Area %
Cannabidiol	73.91
delta-9-Tetrahydrocannabinol (Dronabinol)	6.85
Cannabichromene	3.08
Caryophyllene	1.55
Selina-3, 7 (11)-diene	1.42
β myrcene	1.21
Cannabigerol	1.17
Aromandendrene	1.05
α-Bisabolol	0.64
Humulene	0.62
Cannabicyclol	0.53
γ-Eudesmol	0.52
Guaiol	0.51
10-epi-α-Eudesmol	0.44
Bulnesol	0.44
β-Selinenol	0.3
D-Limonene	0.28
Alloaromadendrene	0.27
10-epi-α-Eudesmol	0.24
Santolina triene	0.22
delta-8-Tetrahydrocannabinol	0.2
Nerolidol	0.19
α-Farnesene	0.18
Linalool	0.15
α-Guaiene	0.14
Selina-4,11-diene	0.12
epi-β-Selinene	0.08
δ-Guajene	0.08

Compound Identified	Area %
γ-Elemene	0.07
7-epi-β-Eudesmol	0.07
trans-α-Bergamotene	0.06
β-Farnesene	0.06
α-Terpineol	0.05
α-Gurjunene	0.04
δ-Selinene	0.04
7-epi-β-Eudesmol	0.04
β pinene	0.03
Fenchol	0.03
α-Gurjunene	0.03
β-Guaiene	0.03
2,6,11,15-Tetramethyl-hexadeca-2,6,8,10,14-pentaene	0.03
β-Ocimene	0.02
Borneol	0.02
Sativene	0.02
α-Muurolene	0.02
Alloaromadendrene	0.02
δ-Carene	0.01
α-Terpinolene	0.01
α-Ylangene	0.01
-α-Bisabolene	0.01
Alloaromadendrene	0.01
Isocaryophyllene	0.01
2,6,10-dodecatrien-1-ol, 3, 7, 11-trimethyl	0.01
Vitamin E	0.01
β- Amyrin	0.01

Signed: _____ Date: 21/08/2019
Tainia Taylor
(Laboratory Analyst)

Signed: _____ Date: 21/8/2019
Wayne McLaughlin
(Director)

Certificate of Analysis

<table>
<tr><td colspan="3">This certificate/report is a correct record of the measurements and observations made. The certificate/report is intended for the private information of those for whom the work was done and must not be used in whole or part in any other way except with the written approval of the Head of Caribex, UWI.</td></tr>
<tr><td>Test: Terpene Screen analysis</td><td>Trace Code: 'Silva Cure'</td><td>Page 3/6</td></tr>
<tr><td></td><td colspan="2">Date submitted: June 6, 2019
Date Analysed: June 29-July 01; July 30, 2019</td></tr>
<tr><td>Client: H2K Agro Jamaica</td><td colspan="2">Lab no.: CT18G0028_A</td></tr>
<tr><td>Product: Plant material</td><td colspan="2">Test Method :
1. Profiling of Terpenes for various types of Plants (CT WI # QA 16)</td></tr>
<tr><td></td><td colspan="2">Storage conditions:
Refrigerate</td></tr>
</table>

Remarks:

1. Terpenes were extracted in hexane. The hexane extract was then injected on the GCMS for a general screen for organic compounds.
2. Compounds detected were reported as percentages of the total organics in the hexane extract.
3. Compounds not soluble in hexane are not reported.
4. Screening involves Library Searching where the computer matches the unknown compound's mass spectrum with that in a "library" to produce a list of "best fit" matches. We use a 214,000 compound NIST library. A list of "Tentatively Identified Compounds" is generated and a match quality ('Qual') is assigned with a perfect match being 100%.
5. The screen results are **unconfirmed and subject to verification**.
6. Since the results of the database search are based on match factors, it is recommended that compounds of interest should be compared with reference standards of the pure material to confirm their identities.

END OF REPORT

HARVEST:

The harvested plants were placed in a dry room at a humidity level of 50-55%. The plants were ready for curing after seven days.

The Drying Process

Prior to drying there were a number of issues that were discussed, including deciding where to facilitate the drying and curing of so many plants. The area selected was not ideal however, it was a satisfactory location. There were some issues at the designated area for drying, the air-condition unit failed to function on two occasions: 1) during the drying period and 2) during the curing period, thus affecting the overall bud quality.

Sourcing a dehumidifier proved to be very challenging as there was none available at the time either to purchase or borrow. However, we managed to obtain one from another grower after a few days into the drying process.

The Curing Process

The initial challenges which were faced during the drying period impacted on the overall quality and quantity of cured buds. Some amount of mould concerns developed for a few of the plants resulting in these being discarded.

Appendix 1

Trial observation			
Date	**Details**	**Application**	**Observation /Comments**
15-Oct-19	308 Clones were received and set in grow bags	None	Clones were showing signs of stress and shock at transplant
22-Oct-19	The plants were laid out in the Grow House. These plants consisted of four different strains: Silver Cure, Mercy, Blue Vision and Ark. 8 solar lights were installed	Water Only for the first couple of weeks	Plants started to show signs of recovery from initial shock and stress
23-Oct-19	Plants were drenched with D'Nemo and Wholesome (80% soil & 20% foliar)	40ml D'Nemo, 40ml Wholesome	This was a precautionary measure to treat with any soil pathogen that may exist in the grow bags
25-Oct-19	Organic matter was applied to the soil of the plants	1/2lb (250 grams) Organic Matter	Organic matter that was applied is OMRI certified and approved
31-Oct-19	iSOL program commenced	25 ml iSOL per plant	Each plant was hand watered using the iSOL treatment. Plants were responding favourably to the applications.
01-Nov-19	Foliar Spray application was done	30ml Wholesome, 30ml Strike, 30 ml Osil, 30ml D'Nemo,	This cocktail was prepared and applied as noticeable signs of various pest (chewing & sucking pest) started to affect plants such as worms, stink bugs, leaf septoria (yellow leaf spot) and leaf miners to name few
01-Nov-19	Soil management (soil was amended with organic content). Secondary Culture was prepared	1/2 lb Organic Matter	Organic matter was applied. Earthworms were seen in the soil of the bags.
05-Nov-19	Concerns regarding the Ark Strains little or slow response to the treatments	NA	Of all the plants that were in the house it was noted that the Ark strain was not doing too well. This was a newly imported strain that was initially designed for indoor growing. Little or no information was available about this plant genotype and phenotype.
05-Nov-19	Soil treatment was done	Secondary Culture	Culture was brewed for approximately 5days prior to

			application
08-Nov-19	Additional soil was added to the bags and plants were pruned	Wholesome and Dnemo	Evidence of adventitious roots was seen. Soil was treated with Dnemo and Wholesome at least five days prior to adding to bags
09-Nov-19	Isol was applied	50ml Isol, 100ml OPhos, 100ml Isurge, 100ml Wholesome, 24 gram I-Micro, 50 ml Vitazyme, 50 ml Renerzyme	iSOL was increased in response to plant growth and development
10-Nov-19	Foliar Application	125 ml Wholesome, 125ml D'Nemo	Preventative application
11-Nov-19	Foliar and Root application was done	30-gal Secondary Culture (Eco-boost); 20 gram I-Micro	Top soil that was used had a few pieces of charcoal in same and therefore, a mix of Eco-boost was applied. Slight yellowing of leaves was observed hence, a foliar application of I-Micro
13-Nov-19	Isol Application. Three plants from each strain were selected to be tracked based growth and response to the Isol program.	50ml Isol	The Average length of the plants was 20-35 inches. The size varies based on the strain. The Silver Cure ranges between 33-35 and the others are others were 20-32inches. The plants grew approximately 10 inches.
14-Nov-19	Isol Application	Isol	The Ark strains were still not responding to the protocol as the other strains. The stems were brittle and continued to break relatively easily. It was noted that these strains are newly imported to Jamaica. As a result, it was recommended to remove said strain from this current trial and replace with another strain.
17-Nov-19	Plants were watered with Molasses	1/2 litre Molasses	Molasses works as a chelating agent, or organic stimulant, to convert the soil's tied-up nutrients into a form

		(500ml)	that's easily available to plants. Chelated minerals can be absorbed directly and remain available and stable in the soil.
22-Nov-19	Isol Application foliar	5 gal Isol	
23-Nov-19	Plants were watered with Molasses	1/2 litre Molasses (500ml)	Molasses works as a chelating agent, or organic stimulant, to convert the soil's tied-up nutrients into a form that's easily available to plants. Chelated minerals can be absorbed directly and remain available and stable in the soil.
26-Nov-19	Instant Secondary Culture was applied via the venturi	1 litre Molasses; 1 litre Eco-boost; Water	
29-Nov-19	Isol Application	Isol	
01-Dec-19	Isol Application	Isol	
02-Dec-19	The plants were pruned for better air flow		
03-Dec-19	Lights were removed from the plants two weeks ahead of schedule.		Plants are between 3-5ft tall. They continue to grow at least 1.5inches per day.
04-Dec-19	Plants were watered using molasses	1 litre Molasses; Water	
06-Dec-19	The house was stringed to facilitate trellising		
07-Dec-19	Plants were watered using molasses	2 litre Molasses; Water	
09-Dec-19	Foliar Feed	93 gram Magnesium Sulphate; 100 gram NPK; 70 ml WIO; 10 gram I Micro; 5 gal water	A few pests have been identified Aphids, Whiteflies, Stink bug, Trips

Appendix 2

Issues faced during the growing period and possible solutions			
	Issues	**Causes**	**Solutions**
1	Whiteflies		Growcare with Wholesome; Strike with wholesome
2	Worms		Strike (in the budding stage), Growcare(in the vegetative stage), WIO (in the nursery stage), D'nemo
3	Ants		Strike, wholesome and Dnemo mixed in the soil
4	Termites	Drying and decaying matter in excess	Dnemo with Wholesome
5	Fungus	Temperature; too humid or too hot	20 g Epsom Salt, 3 tsp Baking Soda, 1 1/2 tsp Moringa oil was mixed with 5 - gal water: WIO and Wholesome
6	Yellowing of Leaves Fungus identified as Leaf Septoria	Various factors may be the cause of said these include nutrition, overwatering, incorrect pH range, potassium deficiency	Vitazyme… other products can be used based on observation, Microbial Treatment
7	The weight of the buds can cause trees to topple over or break the branches		Additional support is given with the use of bamboo sticks or trellising
8	Clones were lost in the nursery stage of development	Improper sanitize bins; unhealthy clone, unhealthy mother plant	To sanitize bins, use aqua-chill, select clones from healthy mother plants
9	Weather Conditions (Rain)	Create high humidity which maybe ideal for fungal growth	Spray with WIO
10	Spider Mites		
11	Aphids		Use Dnemo oil
12	Powdery Mildew		WIO as a preventative means
13	Bud Rot		Wholesome as a preventative measure
14	Stink bug		Growcare, Wholesome, Strike D'Nemo

Beneficial Bugs and insects that were noted during the Trials			
1	Earthworm	These are beneficial to Cannabis	
2	Assassin Bugs	These are beneficial to Cannabis	
3	Toads/Frog	These are beneficial to Cannabis	
4	Ladybug	These are beneficial to Cannabis	
5	Bees/Wasp	These are beneficial to Cannabis	
6	Lizard	These are beneficial to Cannabis	
Pest and Disease that were noted during the Trials			
1	Mildew		Growcare, Wholesome, Strike D'Nemo
2	Aphids		Growcare, Wholesome, Strike D'Nemo
3	Leaf Septoria		Growcare, Wholesome, Strike D'Nemo
4	Mould		Remove the section with the mould and apply wholesome
5	Spider Mites		Use Dnemo oil
6	Powdery Mildew		WIO as a preventative means
7	Bud Rot		Wholesome as a preventative measure
8	Stink bug		Growcare, Wholesome, Strike D'Nemo
9	Whiteflies		Growcare with Wholesome; Strike with wholesome