



Project TAP–5: The Collaborative Breeding of Five Tropically Adapted Potato Varieties

Annual Progress Report (2020)

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Tropically Adapted Potato Varieties**

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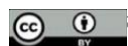
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Abbreviations

BW	Bacterial wilt
CIP	International Potato Center
COVID-19	Coronavirus Disease 2019
DCP	Department of Crop Production
DM	Dry matter
DUS	Distinctness, Uniformity and Stability
FCRI	Field Crops Research Institute
HZPC	HZPC Holding B.V.
LB	Late Blight
LBHT	Late Blight Heat Tolerant
LTVR	Lowland Tropics Virus Resistant
MARD	Ministry of Agriculture and Rural Development
NASH	Nucleic Acid Spot Hybridization
PLRV	Potato Leafroll Virus
PMTV	Potato Mop Top Virus
PPD	Plant Protection Department
PSTVd	Potato Spindle Tuber Viroid
PVA	Potato Virus A
PVFC	Potato, Vegetable and Flower Research Center
PVM	Potato Virus M
PVS	Potato Virus S
PVT	Potato Virus T
PVX	Potato Virus X
PVY	Potato Virus Y
RRD	Red River Delta
SFSA	Syngenta Foundation for Sustainable Agriculture
TCDVd	Tomato Chlorotic Dwarf Viroid
TPMVd	Tomato Planta Macho Viroid
TRV	Tobacco Rattle Virus
TPS	True Potato Seed
VCU	Value for Cultivation and Use

1 PROJECT OVERVIEW

Project Name: TAP-5: The Collaborative Breeding of Five Tropically Adapted Potato Varieties

Project Goal: To increase potato productivity, stability, and competitiveness and enhance food security and family income of resource-poor farmers of Southeast Asia.

Collaborating Partners: International Potato Center (CIP), HZPC Holding B.V. (HZPC), and Syngenta Foundation for Sustainable Agriculture (SFSA)

CIP Program Alignment: Through its Strategic Program, Agile Potato for Asia, CIP aims to improve systems productivity and farm incomes of at least 7 million households in targeted Asian countries over the next 10 years. These improvements will be achieved through the development and use of early-maturing agile potato varieties that will contribute to enhancing food security and providing reliable sources of equitable income from ware and seed potato value chains.

Shared Institutional Goal: To enhance effectiveness and impact from breeding by combining strengths of the public and private sector.

Executive Summary: In Southeast Asia, potato varieties are primarily developed by public sector which not always addresses the package of traits customers' desires. In addition, seed multiplication facilities are not up to the job of meeting the demand of domestic farmers. This situation is further aggravated by the presence of only few commercial seed multipliers leaving potato farmers almost entirely dependent on the informal seed system providing poor quality seeds and inferior varieties. Development of potato varieties requires long term investment in the form of technical expertise and infrastructure. It is, therefore, very important to maximize the chances that the developed varieties are widely adopted by the farmers and the value chain. To speed up the breeding and selection processes and ensure the adoption of developed varieties by strengthening the seed value chain, TAP-5 project was initiated between the International Potato Center (CIP) and HZPC in 2016, with the financial support from the Syngenta Foundation for Sustainable Agriculture (SFSA).

The year 2020 brought some very unusual adverse experiences and additional challenges in the form of COVID-19, while impacting all the sectors globally primarily due to lockdowns and restricted movements. Food security are greatly affected due to decreased purchasing power thus putting direct impact on the most vulnerable class. During such crisis, cereals contribute to food security but crops like potato which can be stored comparatively for longer period than other vegetables and provide some of the important lacking vitamins, minerals and antioxidants in cereals, improves nutritional security. The importance of large farmers is always acknowledged in agriculture production, but the role of small holder farmers turned more prominent during the COVID-19 crisis due to their local presence in remote areas which otherwise were non-accessible due to restricted movements. The project already has a clear focus on strengthening smallholder farmers by ensuring their access to affordable quality seed and improved potato varieties.

The project activities started in 2016 in Vietnam, when true potato seed (TPS) of newly developed population were received in two sets at one month's interval from CIP Peru. The populations of these sets were merged and are now at the most advanced stage currently at F₁C₅ stage with four selections. These selections have been planned to be transferred to India, Indonesia and African countries according to their specific interest. Three of these clones are already available in HZPC in The Netherlands for international distribution. Two clones from the same families selected in lowlands are currently under evaluation at F₁C₅ stage. Clones being evaluated from

Set 2 only following different selection pathway are at F₁C₄ stage with seven clones in highlands and nine clones in lowlands. Set 3 of the same families received in 2017 are at F₁C₄ stage in highlands as well as in lowlands with eight and ten selected clones, respectively. In total, 152 selections have been made at F₁C₂ stage from Set 4 of 83 families received in August 2018. Two TPS sets of approximately 10,000 seeds from 40 families have been received from CIP Peru and HZPC in The Netherlands, respectively in 2020. The set from Peru consists of bacterial wilt tolerant families developed by crossing clones from CIP bacterial wilt tolerant population and HZPC advanced clones. The set from HZPC consists of TPS families developed for targeting commercial traits and considered suitable for lowland tropics. These sets have been sown in the screenhouse for their initial evaluation in pots in PVFC, Dalat.

A total of six clones consisting of all initially shortlisted five clones were tested at FERA in the UK for presence of Ralstonia, Clavibacter, soft rotting bacteria, PVY, PLRV, PVX, PVS, PVV, PSTVd, TPMVd, TCDVd, TRV and PMTV. All six clones were found bacteria, virus and viroid negative. Additionally, the same five selected clones were sent to HZPC for back-up and for maintaining a parallel stock for international disbursement. All the five shortlisted clones are available for multiplication at HZPC facilities after obtaining clearance from Dutch quarantine authority.

During the year, regular online monthly meetings were organized among SFSA, CIP and HZPC to develop product launch plan and review the results of shortlisted clones to be shared with other countries in Africa and Asia. The most advanced three clones are being multiplied in screenhouse at PVFC from *in-vitro* stock for demonstration and variety release trials in different provinces of Vietnam.

The prime target of the project is to develop biotic stress resistant varieties for processing and fresh sectors. All the biotic-resistant clones shortlisted from the most advanced scheme have been identified for fresh consumption. The gap still exists for the processing sector and a continuous brainstorming among the stakeholders is being going on to identify the processing clones from the following schemes and newly received populations.

COVID-19 pandemic has restricted movements and impacted activities globally for all sectors including agricultural research institutes. Initially due to enforced lock-down in Vietnam and uncertainty of the pandemic's spread in coming days, trials in Dalat were postponed for two months. Other than this, there was no other deviation in the originally planned schedule. All field activities and germplasm transfer to FERA in the UK and HZPC in The Netherlands were done successfully on scheduled time.

2 PROGRESS OF TAP-5 PROJECT THROUGH 2020

The submitted progress report covers field and related activities carried out between **January 2020 and December 2020**. Prior status of the project is available in the three annual reports submitted previously.

2.1 GENETICS

2.1.1 Development of LBHT (Late Blight resistant, Heat Tolerant) population

With the aim to broaden the genetic diversity for resistance or tolerance to prominent regional biotic stress i.e., late blight and abiotic stress (i.e., heat) new populations are being developed at CIP facilities in Huancayo, Peru. Male parents from HZPC genepool are being crossed with CIP female parents by using transferred frozen pollen from The Netherlands to Peru. In the crossing program, eight elite HZPC lines are being used, which are resistant to PVY and other diseases, have good tuber appearance, good processing quality and high yield (Annex 1). Thirty-four elite clones from CIP LBHT population and 16 elite clones from the new generation developed by combining LBHT and lowland tropics virus resistant (LTVR) populations, are being used as female parents in the crossing program (Annex 2 and 3). In addition to its resistance to late blight, these two CIP groups have been characterized for early maturity, heat tolerance and some with extreme resistance to Potato Virus X (PVX) and Potato virus Y (PVY). Pollen samples were tested for viability by using acetocarmine staining method, where most of the clones except HCIP7049 and HCIP7059 showed strong viability (Annex 4).

2.1.2 Installation of crossing block

In August 2020, 10 tubers of each female parent were planted in 4-inch pots, and 30 days later the plants were transplanted to 10-inch pots to follow the crossing techniques developed by CIP. The technique emphasizes on preventing tuberization and senescence of the plant and induces higher degree of flowering for a longer period of two months. This growing season is also supported by an increase in the hours of daily light through simulating long days conditions. To ensure enough quantity of seeds through extended period of pollination, *in-vitro* plants of all 50 female parents were transplanted again in pots in October 2020 to be used in January and February 2021 for second round of crossing.

2.1.3 Pollination

Pollination begun as soon as the pollen arrived in Huancayo on 10th November. Pollen was separated in two or more lots according to the amount of pollen received for each parent. The lots with extra pollen have been cold stored at 5°C, for successive pollinations. Status of pollination and berry setting up to 28 December 2020 is presented in Annex 5. A total of more than 4700 flowers were pollinated which produced more than 1100 fruits for 101 progenies. Total 41 LBHT and three HZPC parents were part of successful progenies. Crossing with the five HZPC parents did not produce any berry. Due to unknown factors, the pollen viability of the best genitors has been negatively influenced in an unpredictable way.

2.1.4 Molecular Analysis of LBHT parents

To identify the presence of other resistance genes in the LBHT population with molecular markers, freeze-dried isolated DNA of each of the 50 female parents from the plants of the second group has been prepared for shipment to HZPC laboratory in The Netherlands on 11 January 2021. Leaf samples of all the clones were

sent to the CIP virology laboratory for examining PSTVd and PVT through NASH test. The results indicated no presence for both the tests.

2.2 CLONAL SELECTION IN VIETNAM

2.2.1 Background

TAP-5 project has been initiated with the aim to develop potato varieties suitable for tropical conditions and good commercial qualities. The project partners selected Vietnam as the most suitable country to start field operations with the prospects of expanding this joint breeding efforts to additional tropical and subtropical potato production environments in the coming years. The crossing plan involved combining materials from HZPC and CIP from their elite stock. CIP has developed exclusive group of germplasm with resistance to major potato diseases like late blight and viruses suitable for lowland tropics and subtropics, and tolerant to abiotic stress like heat and drought. HZPC contributes with germplasm of potential high yield, efficacy assays, state-of-the-art analytical methods and quality management. New germplasm was developed by conducting crossing program in the screenhouses of CIP at La Molina in Peru. A line x tester crossing pattern was followed to develop a new population for which frozen pollen lots imported from HZPC were used on CIP female progenitors. Crossing was carried out in three seasons spreading over 2015, 2016 and 2018.

A set of common parents involving 41 from CIP and nine from HZPC was used during 2015 and 2016, whereas another set involving different 30 CIP parents was used in 2018. Till 2020, three waves of total six sets have been received in Vietnam consisting of 240 true seed families. Shipment of first two TPS sets arrived at one month interval in 2016, third set in April 2017 and fourth in August 2018. Two more sets were received in 2020 during the month of September 2020 from Peru and HZPC in The Netherlands. All the first five sets received from Peru have been developed by combining germplasm of CIP and HZPC, whereas sixth set received from HZPC consists of selected TPS families from HZPC germplasm. DNA of the progenitors was exchanged between the participating organizations. Molecular analysis of CIP parents was done in HZPC laboratories and the results are being used for progeny selections. All the received TPS sets are being evaluated under different schemes and are at different stages of selection. Selection criteria are tuber traits, disease resistance in field conditions and through DNA analysis, processing traits, performance under high temperature and earliness. A defined protocol and selection criteria developed by the team have been followed for raising and screening the clones. Seedlings of the received TPS families are being raised in greenhouse followed by farmer field evaluations. Set 1 and Set 2 received at one month interval in 2016 have been merged subsequently in one set in highlands and are at the most advanced stage (F_1C_5) with four shortlisted selections.

Dalat (11°56'25.5084"N, 108°27'29.9268"E, 1500 masl), central highlands in Lam Dong province of South Vietnam, provides favorable conditions for potato cultivation throughout the year, and has been identified as the leading center for evaluation of the material. The site allows a high number of phenotypic recurrent selection cycles which otherwise is a substantial barrier in any potato breeding program. A greenhouse of 1,000 m² has been erected at the field station of local partner institute Potato, Vegetable and Flower Research Center (PVFC) in Dalat to evaluate F_1 seedlings and perform parallel multiplication of selected clones across all the stages under disease-free conditions. The selections from F_1 populations are subsequently being evaluated in farmer's field in the surrounding area. For evaluation in lowlands, Hai Phong (20°51'53"N, 106°41'00"E, 8 masl) in Red River Delta was selected, where the main potato season is during winter only. The selections from highlands and lowlands are being transferred between them by adapting shuttle breeding for faster selection and to test their suitability at different altitudes. At early stage of evaluation (F_1C_1), augmented block design has been laid out to

evaluate large number of populations, whereas, in subsequent stages, RCBD layout are followed to evaluate the selections. For statistical analysis, CropStat and HIDAP software are being used. Data in the advanced stages have been collected on growth parameters during cropping season like plant vigor, uniformity, growth habit, flowering and fruiting pattern and senescence. Observations on important biotic stresses including fungi, viruses, bacteria, nematodes, are being recorded on regular interval for selections. At the time of harvesting, clones having tuber defects like hollow heart, internal black spot, greening etc. are being discarded.

2.2.2 Shortlisted promising clones

During the previous year, five clones HCIP316079.206, HCIP316069.204, HCIP316121.108, HCIP316027.101 and HCIP316140.210 were shortlisted from the most advanced population in highlands (Annex 6). These clones were under continuous screening and reviewed periodically during 2020 for confirming their suitability in local conditions and different targeted countries in Asia and Africa. The clones HCIP316140.210 and HCIP316069.204 have also shown promising performance for lowlands. HCIP316079.206 produced good dry matter and chips of good quality but was not as consistent as Atlantic in term of processing traits and dry matter. The other four clones were characterized as more suitable for fresh consumption. Clone HCIP316140.210 which is consistent across the altitudes, has produced very high yield, with moderate dry matter. To ensure smooth distribution of the selected clones, the set consisting of these five clones has been dispatched to HZPC in The Netherlands in May 2020 where it has been declared disease-free by the Dutch authority and should be available to HZPC soon. The same clones were sent to FERA in the UK in July 2020 for disease, virus, viroid and bacteria testing. All the clones were found negative for the requested biotic tests and declared disease-free. Based on additional evaluations, two clones i.e., HCIP316027.101 and HCIP316121.108 were discarded from the list of most promising clones, whereas one new clone HCIP316056.220 was added to the list.

Some important traits of these clones are:

1. **HCIP316079.206:** This clone possesses strong resistance to late blight, PVX, PVY and resistance to bacterial wilt. It has good dry matter (19.7%), acceptable chipping score (2.15) and French fry qualities (2.65), 28.9 t/ha average total yield, 85 days maturity and yellow flesh color (Figure 1). Initially, it was tested for the processing market segment, but its chipping quality was not as consistent as Atlantic, and so it was decided to consider it for the fresh market. It has comparatively poor ratio of marketable tubers, and sometimes tubers are misshapen and knobby. HZPC contact points from Africa have shown its interest in testing it locally.
2. **HCIP316069.204:** The clone is good yielder (average 31.6 t/ha) and has resistance to major diseases in lab and field condition like late blight, PVX, PVY, and is moderately tolerant to bacterial wilt (Figure 2). It is early maturing in 80-85 days. Average dry matter of this clone is 18.8%, which is considered good for fresh consumption in local conditions. Also, reducing sugar (0.28%) is below acceptable limit. It is yellow fleshed and produced 5.92 t/ha of dry matter. Though it is doing well in most of the parameters, still some of the tubers are knobby-shaped. Partners from Africa have shown their interest in testing this clone.
3. **HCIP316140.210:** The clone is very high yielder (average 39.7 t/ha) and performing well across highlands and lowlands. It is resistant to major diseases like late blight, PVX and PVY (Figure 3). Boiled and cooked potatoes have good flavor. It has low dry matter (17.4%), with poor processing qualities like chipping and French fries. It has a medium length maturation period (90 days) and white flesh color. Among all the shortlisted clones and checks, it has the highest dry matter yield of 6.9 t/ha. This is the only clone, which has been requested by Africa, Indonesia and India for further local testing.

4. **HCIP316121.108:** This clone carries late blight and PVX resistance. It has appreciable dry matter (18.6%), low reducing sugar (0.25%), with total and dry matter average yield being 28.8 t/ha and 5.36 t/ha respectively (Figure 4). The clone is medium maturing (90 days) and does not carry resistance to PVY or bacterial wilt. Flesh color is white and has higher ratio of big and smaller tubers.
5. **HCIP316027.101:** The clone produces good yield (average 30.9 t/ha) and possesses resistance to major diseases, like late blight, PVX, PVY (Figure 5). It is found to be moderately tolerant to bacterial wilt. Despite performing well for some important traits, it has started producing some cracked tubers in advanced generations. It matures in 95 days and has low dry matter (17.9%). Due to the cracking issue, it has been decided to discard it from the shortlisted clones.
6. **HCIP316056.220:** This clone was not in the list of shortlisted clones, but HZPC's partners in India has shown its interest to evaluate it. This clone is also late blight, PVX and PVY resistant. It is early maturing (80-85 days) and produces good tubers (Figure 6). It is white flesh colored with good flavor. It produced 25.1 t/ha average yield. Due to moderate total yield and dry matter, its dry matter yield is medium (4.84 t/ha). Due to resistance to prominent regional diseases and viruses and early maturity, Indian partners have shown their willingness to evaluate it.
7. **Checks:** For the most advanced population, three checks were compared with the advanced clones in highlands- Atlantic for the processing market and PO3 and O7 for the fresh market. All the checks are late blight susceptible and produced average total yield significantly lower than the shortlisted clones (Atlantic: 16.8 t/ha, PO3: 21.7t/ha and O7 20.2 t/ha). Atlantic and O7 matures in 85-90 days, whereas PO3 is early with 85 days maturity. All the three checks are PVY resistant and have moderate tolerance to bacterial wilt. Dry matter yield of all the three checks were significantly lower than the shortlisted clones (Atlantic: 3.46t/ha, PO3: 3.96 t/ha and O7: 3.82) (Annex 7).

2.2.3 Advancement of the shortlisted clones:

To test the most advanced clones, HZPC discussed with partners in Africa, Asia and Indonesia on local evaluation of the shortlisted clones according to the region-specific preferences. HCIP316140.210 was preferred by all the three partners, whereas HCIP316079.206 and HCIP316069.204 were additionally requested by Africa. India showed its further interest in HCIP316056.220 (Figure 7). All the clones have been shipped to HZPC facilities in The Netherlands and are also maintained in Vietnam at PVFC facilities. During shipment, HCIP316056.220 died before arrival in the Netherlands, which might be related to the unfavorable shipping conditions or an unknown disease infection. Considering the logistic convenience, the successfully received clones will be distributed from one or the other partner. Clone HCIP316056.220 which died during shipping, will be again shipped to HZPC in 2021 from PVFC where it is maintained *in-vitro*. None of these advanced clones so far have been found better than Atlantic in terms of processing qualities. Currently, all the advanced shortlisted clones are being tested for the fresh market.

2.2.4 Status of all field- tested populations including shortlisted clones:

From Set 1 and Set 2, 15 clones have been selected for both highlands and lowlands for the fresh and processing markets, whereas 13 clones from Set 3 and 152 clones from Set 4 are still under evaluation for further selection (Annex 8-12).

1. **Set 1 and 2:** In total, eight clones have been selected for highlands, out of which three will be tested for the processing market while all of them will be tested for the fresh market. Three clones have been selected for

lowlands and are suitable for the fresh market. Four clones have been found promising for both highlands and lowlands for the fresh market. One clone VR01-1-2 from CIP population has been retained for further testing for highlands and lowlands (Annex 13).

2. **Set 3:** In total, 13 clones have been selected (Annex 14). Four clones have been selected for highlands for the fresh market. From the same set, six clones have been retained for lowlands: four for the processing market and all for the fresh market. Three clones have been performing well for both altitudes of which two are for the processing market and all for the fresh market.
3. **Set 4:** 152 clones have been selected for further evaluation at F_1C_2 stage.

2.3 SCHEME-WISE PROGRESS IN FIELD TRIALS:

2.3.1 Selections in Scheme 1 and 2 consisting of Sets 1 and 2:

Evaluation of TAP-5 clones is at different stages depending on the arrival of their respective sets in Vietnam, their testing in highlands and lowlands, and their adaptation to both altitudes. Most advanced clones from Set 1 and Set 2 are under evaluation in four groups. The most advanced group from this population is the result of immediate shifting of extra tubers of selected clones of Set 2 in 2017 from lowlands at F_1 stage and their merger with selection of Set 1 in highlands. This group was evaluated in 2020 at F_1C_5 stage in highlands. The second group in highlands is from the selections of Set 2, which were transferred from lowlands at F_1C_1 stage in 2018. This group was evaluated in 2020 from July to October at F_1C_4 stage. There are two groups from same sets in lowlands which were evaluated at F_1C_4 and F_1C_3 stages, respectively. The advanced population at F_1C_4 stage selection is the result of shift of merged population from highlands to lowlands in 2018 at F_1C_2 stage. Whereas the group evaluated at F_1C_3 stage is the selections of Set 2 being carried out in lowlands since its introduction in Vietnam.

Results of the trials conducted during 2020 from the clones received under Set 1 and 2 are:

Hai Phong

Field trials were conducted in two farmer's fields at Hai Phong from 11 November 2019 to 6 February 2020 at Dai Cong village in Tien Cuong commune and My Khe village in Tu Cuong commune. In all the trials, local checks Atlantic, Marabel and Solara were planted along with the evaluated clones.

Eight clones received from the harvest at Dalat in June 2018 were planned to be evaluated in Hai Phong in both locations. Six clones could be screened in both fields, whereas two clones HCIP316163.101 and HCIP316136.101 with a smaller number of tubers were planted in one field only. Two clones HCIP316069.204 and HCIP316140.210 were selected based on growth traits, yield and disease resistance. The selected clones were also subjected to dry matter and reducing sugar analyses.

- a. In the first field trial of most advanced clones, HCIP316140.210 (29.6 t/ha) out-yielded all the three checks (Atlantic with 17.0 t/ha, Solara with 14.6 t/ha, and Solara with 11.2 t/ha). The same clone also produced very large average tuber weight (104.5 g) as compared to the checks (Annex 15-17). In the second field trial, again HCIP316140.210 (48.3 t/ha) produced significantly higher yield than all the clones in the trial including checks (Solara 18.8 t/ha; Atlantic 17.6 t/h and Marabel 14.0 t/ha). Though the yield of HCIP316056.103 was lower than the selected clones and checks, it was retained due to its tuber quality and history of previous performance. Two selected clones were also tested for dry matter and reducing sugar (Annex 18). Dry matter of HCIP316069.204 was moderate (19.4%) and better than

two checks Solara (18.5%) and Marabel (17.4%), but less than Atlantic (23.2%). Dry matter of clone HCIP316140.210 was very low (15.1%) and needs further evaluation of dry matter. Their reducing sugar content was intermediate between Marabel (lowest) and Atlantic and Solara (highest).

- b. Seventeen selections from Set 1 and 2, which are under evaluation in Hai Phong since their introduction in Vietnam were evaluated in two trials of 10 tubers and 5 tubers per replication depending on the tubers available of the selected clones. Six clones were evaluated with 10 tubers/replication and 11 clones with 5 tubers/replication trials. In total, nine clones from both trials were retained for further screening.
 - In the trial with 10 tubers/replication, among the selected clones HCIP316132.207 (24.6 t/ha) produced yield higher than the best yielder check Solara (23.4t/ha), whereas except HCIP316056.205 (11.7 t/ha), all other selected clones produced yield higher than Atlantic (15.7 t/ha) and Marabel (14.7 t/ha) (Annex 19-21). None of the clones produce dry matter higher than Atlantic (23.2%), though HCIP316041.205 (22.1%) and HCIP316041.203 (20.7%) produced noticeable amount of dry matter (Annex 22).
 - In the trial with 5 tubers per replication, among the selected clones, HCIP316009.203 (47.5 t/ha) and HCIP316116.103 (37.7 t/ha) produced higher yield than the checks - Atlantic (27.4 t/ha), Marabel (20.4 t/ha) and Solara (34.2 t/ha) (Annex 23-25). In this trial, HCIP316116.103 in addition to higher yield also has the highest dry matter (21.0%) among the selected clones (Annex 26).
- c. In the second field trials, six advanced clones (from the set of the most advanced eight clones having extra tubers) were evaluated in a different agro-ecology. In this trial, HCIP316140.210 out-yielded (48.3 t/ha) all the clones and checks in the trial (Annex 27-28). Though the dry matter was again not so good for this clone (15.6%), the production of dry matter per ha was the best (7.29 t/ha) compared to the other clones and checks due to its very high yield (Annex 29).

Dalat

In Dalat, trials were conducted with clones from Set 1 and Set 2 during three seasons.

- a. First season was planted from 13th November 2019 to 17th February 2020 in Duc Trong district in Lam Dong province near to Dalat airport. 18 clones at F₁C₃ stage, including two CIP advanced clones (LB-44-1-4-5 and VR01-1-47) were evaluated in this trial, whereas two clones HCIP316056.205 and HCIP316116.102 with lower number of tubers were multiplied in the greenhouse. Eight clones were planted with six tubers/replication, whereas the remaining eight TAP-5 and two CIP clones were planted with 20 tubers/replication. Thirteen TAP-5 and both the CIP clones were retained for further evaluation. The clones were evaluated again from July to October 2020 in Dalat.
 - In the first trial of 6 tubers/replication, eight clones were planted. Due to a smaller number of tubers HCIP316056.222 and HCIP316116.103, these clones could not be replicated. Clones HCIP316144.108, HCIP316056.226 and HCIP36034.105 were replicated only twice in the same trial. HCIP316056.202 (39.7 t/ha) produced maximum yield in the trial, which was significantly higher than Atlantic (19.0 t/ha) (Annex 30-31). Dry matter and chipping score of the selected clones in this group was also good (HCIP316034.105: 19.1%, 1.1; HCIP316056.202: 21.7%, 1.0; HCIP316170.202:18.5%, 1.6) (Annex 32).

- The second trial of total 10 clones was planted with 20 tubers/replication. Clone HCIP316121.202 (48.4 t/ha) produced also maximum yield in the group which was significantly higher than Atlantic (23.7 t/ha) and O7 (28.8 t/ha). Check PO3 produced 44.2 t/ha yield (Annex 33-34). Clone HCIP316040.214 (41.4 t/ha) also produced significantly higher yield than Atlantic and O7. Clones HCIP316132.205 (21.9%, 1.5) and HCIP316099.108 (20.2%, 1.2) gave good dry matter estimation as well as had promising chipping traits (Annex 35).
- b. Second season was planted from 3rd June to 3rd September 2020 in Da Quy and Xuan Thanh villages in Xuan Tho commune in Dalat in Lam Dong province.
- All the 14 advanced clones were evaluated in different groups during the season based on the tubers available for each clone. The shortlisted most advanced five clones were evaluated in two locations with one CIP clone VR01-1-2. First trial of advanced clones was planted with 18 tubers/replication and second trial with 30 tubers/replication. Whereas, remaining nine clones were placed in different three groups including Set 3. **The results of these nine clones are discussed under Scheme 3 as they were planted together due to similar number of tubers for evaluation.**
 - Clone HCIP316140.210 produced the best yield (39.0 t/ha) in the first trial, which was significantly higher than all the clones and checks in the trial (Annex 36-38). HCIP316069.204 produced 26.4 t/ha, which was better than the checks Atlantic (21.1 t/ha), O7 (14.7 t/ha) and PO3 (15.2 t/ha). These two clones also produced average tuber weight (HCIP316069.204: 127.7 g and HCIP316140.210: 125.1g) significantly higher than checks (Atlantic: 86.1 g, O7:74.5 g and PO3: 55.9 g). HCIP316140.210 produced largest tuber weight for marketable size (182.9 g).
 - In the second trials of the same advanced clones, HCIP316140.210 again produced the best yield (40.8 t/ha). Clone HCIP316069.204 (29.4 t/ha) also produced significantly higher yield than checks: Atlantic (3.4t/ha), O7 (13.4 t/ha) and PO3 (8.8 t/ha). Due to very high and consistent rains, checks produced very low yield and late blight significantly reduced the yield for checks (Annex 39-41). Clone HCIP316027.101 produced heaviest average tuber weight (99.7 g), though presence of cracked tubers made it non-preferred clone. Clones HCIP316069.204 (98.6 g) and HCIP316140.210 (93.7 g) produced average tuber weight significantly higher than Atlantic (35.5 g), O7 (63.2 g) and PO3 (34.5 g). Clone HCIP. HCIP316140.210 also had the highest dry matter content (18.6%) in the group after Atlantic (19.0%), while its chipping score was not good (4.00) (Annex 42).

The third season was planted from 07th July to 07th October 2020 in Xuan Thanh village in Xuan Tho commune in Dalat in Lam Dong province. All the clones were divided in three groups based on the tubers available for planting (Annex 43-53). In first group, five clones including two CIP clones were planted with 10 tubers/replication. In the second group, three clones were planted with 30 tubers/replication and in the third group seven clones were planted with 60 tubers/ replication. 13 TAP-5 clones at F₁C₄ stage and two CIP clones were evaluated in the trial. Seven clones have been retained for further selection. Across all the groups, HCIP316041.203 (23.6%) and HCIP316041.205 (21.1%), HCIP316121.202 (20.3%), HCIP316056.202 (20.8%) and HCIP316132.205 (20.9%) produced dry matter higher than Atlantic (19.9%). Chips of clone HCIP316121.202 (1.1) were also closer to Atlantic (1.0). Based on the yield, tuber traits and disease resistance in the field, some of the clones were further rejected. Indeed, the clone HCIP316140.203 was rejected due to small tubers and HCIP316121.202 for history of PVY susceptibility.

2.3.2 Selections in Scheme 3 consisting of Set 3

Under this scheme, two groups are under evaluation in highlands and lowlands. During November 2019 to February 2020, the first group was evaluated at F₁C₃ stage in lowlands in Hai Phong, whereas the second group was screened at F₁C₄ stage in highlands from June to September.

Hai Phong:

Field trials were conducted in farmer's field at Hai Phong from 11th November 2019 to 6th February 2020 Dai Cong village in Tien Cuong commune. In all trials, local checks Atlantic, Marabel and Solara were planted along with the evaluated clones.

16 clones were evaluated from Set 3 selections brought from Dalat in 2018. 10 clones were evaluated with 10 tubers/replication and six clones were planted with 5 tubers/replication. One clone HCIP316041.203 was also part of the trial of 5 tubers/replication from Set 2 from Hai Phong selection due to extra tubers available for this clone. Ten clones were retained for further evaluation.

- a. From the first trial with 10 tubers/replication, HCIP316040.7 (39.2 t/ha) and HCIP316121.1 (38.1 t/ha) produced higher yield than the checks Marabel (35.9 t/ha), Atlantic (22.5 t/ha) and Solara (24.1 t/ha) (Annex 54-56). Clone HCIP316040.6 produced dry matter (20.3%) and HCIP316040.7 (18.9%) higher than Marabel (17.4%) and Solara (18.5%) among the selected clones (Annex 57).
- b. In the trial with 5 tubers/replication, HCIP316140.9 and HCIP31674.7 could not be replicated due to low number of tubers. HCIP316041.203 from Set 2 was an additional entry in this trial due to extra tubers available. All the selected clones HCIP316175.1 (27.3 t/ha), HCIP316041.203 (25.7 t/ha) and HCIP316132.4 (25.1 t/ha) produced yield higher than the checks Atlantic (22.3 t/ha), Marabel (24.6 t/ha) and Solara (15.9 t/ha) (Annex 58-60). HCIP316041.203 also produced good dry matter (20.7%), which was higher than Marabel and Solara (Annex 61).

Dalat

The clones were evaluated during a second season trials from 3 June to September 2020 in Da Quy (near to Dolly farm) in Xuan Tho commune in Dalat in Lam Dong province. Eight clones at F₁C₄ stage from Set 3 and nine clones at F₁C₅ stage from Set 1 and Set 2 were grouped together according to the tubers available for each clone and were tested in three different trials.

- a. First trial consisted of four clones of Set 3 and four clones of merged set 1 and 2 with 20 tubers/replication. Clone HCIP316079.203 (39.9 t/ha) produced the best yield in the group, which was significantly higher than all the clones and checks: Atlantic (9.4 t/ha), O7 (18.0 t/ha) and PO3 (11.7 t/ha) (Annex 62-64). Clone HCIP316040.7 (23.4 t/ha) and HCIP316040.5 (23.5 t/ha) produced significantly higher yield than Atlantic and PO3. Clone HCIP316079.203 also produced the best dry matter in group (19.0%), which was equal to Atlantic, whereas HCIP316040.5 (18.6%) was also in good range (Annex 65). None of the clones was closer to Atlantic in terms of chipping score (1.1), except HCIP316056.103 (1.6).
- b. Second trial had one clone from Set 3 and two clones from the merged set 1 and 2 with 10 tubers/replication. In this trial, clone HCIP316063.2 (25.0 t/ha) produced the best yield which was significantly higher than clones and the checks Atlantic (6.8 t/ha), O7 (13.6 t/ha) and PO3 (8.3 t/ha) (Annex 66-68). Dry matter of this clone was 18.1%, less than Atlantic (19.0%) and O7 (18.6%) (Annex 69).
- c. Third trial consisted of four clones from Set 3 and three clones from the merged set 1 and 2 with 30 tubers/replication. Among this group, HCIP316041.1 (35.7 t/ha), HCIP316049.3 (30.4 t/ha) and

HCIP316132.5 (37.1 t/ha) produced significantly higher yield than the checks O7 (16.7 t/ha), PO3 (8.8 t/ha) and Atlantic (8.5 t/ha) (Annex 70-72). Chipping score of HCIP316041.1 (1.4) and HCIP (316056.220 (1.1) was comparable with Atlantic (1.1) (Annex 73).

2.3.3 Selections in Scheme 4 consisting of Set 4

All the 368 clones selected from F₁C₁ were evaluated in farmer's field (321) and screenhouse (47) based on tubers availability from 03rd June to 3rd September 2020 in Da Quy in Xuan Tho commune in Dalat in Lam Dong province. Eighty-two clones with more than eight tubers were planted in two replications, whereas the remaining clones with less tubers were planted in one replication. In total, 152 clones have been selected for further evaluation from replicated, non-replicated and screenhouse planted clones.

Yield data of selected clones was recorded, and statistical analysis was done for those evaluated in two replications. Being at an early stage of evaluation, the selection criteria were mainly limited to genetic traits like tuber shape, disease resistance, flesh color etc. Clones with very few tubers were also not considered for further round of selections. 28 clones were selected from the trial with two replications. Seven clones produced more than 30 t/ha (Annex 74-76), whereas, Atlantic (8.2 t/ha), O7 (16.7 t/ha) and PO3 (8.8 t/ha) produced very poor yield. It is important to mention here that June to September is rainy season in Dalat and continuous and heavy rains do not produce good yields. The best family with ten selections was HCIP317230 (CIP397006.18 x HOM 13-8236) followed by eight selections from HCIP317231 (CIP397077.16 x HOM 13-8236), and also from HCIP317228 (CIP309076.59 x HOM 13-8236). Where more than five selections were done in all the selected families, HOM 13-8236 male parent was present in six out of nine. This male parent is good yielder with light yellow flesh color and moderate dry matter (21.6%). Frequency of the selections of the top 18 families has confirmed HOM13-8236 as the best contributor with a greater number of selected clones (Figure 8).

Among the non-replicated clones, 21 clones produced more than 30 t/ha average yield. Clone HCIP317092.7 (54 t/ha), HCIP317108.49 (52 t/ha), HCIP317217.23 (47 t/ha) were top performer (Annex 77-79). In total, 124 clones were retained for further selection among the non-replicated clones.

The scale for measuring the qualitative traits and disease resistance is described in Annex 80.

2.3.4 Sowing of bacterial wilt tolerant population and TPS received from HZPC

Approximately 10,000 TPS of 40 crosses were received in two sets of populations, one from Peru and the other from The Netherlands. Both the sets were received in September 2020 at PVFC in Vietnam.

Bacterial wilt tolerant population from Lima: The received set contains crosses developed by crossing seven CIP bacterial wilt tolerant clones with six HZPC clones in 2019. In total, 5,707 TPS of 28 families were received (Annex 81).

HZPC clones: A set of 4,276 TPS of 12 HZPC families containing parents exclusively from HZPC germplasm was received in September (Annex 82). Families HCIP20181, HCIP20279, HCIP20390 and HCIP20694 have been developed for processing sector, whereas HCIP20270 and HCIP20590 are dual purpose, that is, for fresh as well for processing sectors. Six families have been developed for fresh segment. All the populations carry resistance against PCN, PVY and late blight. Dry matter ranges from 19.2% (HCIP20269, HCIP20604) to 22.3% (HCIP20181).

Both TPS sets were sown together on two different dates at an interval of one month in October and November to accommodate the transplanting material in screenhouse from all sown TPS.

3 CURRENT ACTIVITIES

3.1 DALAT

1. Three clones, HCIP316069.204, HCIP316140.210 and HCIP316079.206 from most advanced population have been retained for variety evaluation trials and germplasm distribution. Current plan for distributing these clones considers Africa, India and Indonesia.
2. Minituber production of the above shortlisted three clones is being carried out in the screenhouse. The multiplied clones will be used for large testing trials of 500 m² area and demonstration trials. Additionally, one more clone HCIP316056.220 has been desired by India, whose minituber production will also start in 2021.
3. Seven clones from Set 2 and 8 clones from Set 3 have been selected in highlands at F₁C₄ stages. 152 clones have been selected from Set 4 at F₁C₂ stage in highlands. These clones are in store and will be planted in January and February 2021.
4. Thirteen rejected clones from advanced population also have been removed from *in-vitro* stock. A new group of clones which are selections of Set 3 have been added to the *in-vitro* stock. Total 33 clones including checks are under *in-vitro* stock, which includes all the current selections from Set 1, 2 and 3.

3.2 HAI PHONG (RRD)

During the current winter season from November 2020 to February, 2021, a total of six trials from Set 1, 2 and 3 is under progress in two farmer's fields. The material consists of:

1. Nine clones from Set 2 are under evaluation at F₁C₄ stage
2. 10 clones from Set 3 are under evaluation at F₁C₄ stage.
3. Two clones from the merged set 1 and 2 are at F₁C₅ stage.

DNA extraction of 16 clones being evaluated in lowlands will be prepared and sent to HZPC for testing in the first week of January.

4 SUPPORTING APPROACHES ADOPTED IN THE PROJECT

In addition to the regular field, lab and screenhouse activities to screen and multiply superior clones, other approaches related to germplasm distribution, marketing strategies and faster evaluation have been adopted

1. **In total, 20 *in-vitro* plantlets** of eight advanced clones were transported to The Netherlands in May 2020. The dispatched clones are tested under official Dutch quarantine facilities and all the three shortlisted advanced clones have been found healthy and should be available soon to HZPC for research, back-up and distribution purpose. Two clones HCIP316056.220 and VR01-01-2 died during the shipment (Annex 83).
2. **Due to COVID-19 pandemic**, virtual discussions are going on among stakeholders of SFSA, HZPC and CIP to develop a roadmap for product launch in India, Indonesia and Tanzania/Kenya.
3. **HZPC** has approached some private companies and discussion is on for future collaboration for TAP-5 clones' evaluation in Vietnam. In India, HZPC already has a collaboration with Mahindra group.
4. **DNA** extract of 16 clones being evaluated in lowland has been prepared to send to HZPC. The shipment consists of selections from Set 1, 2 and Set 3.

5 FERA TESTING OF MOST ADVANCED FIVE CLONES

To determine the health status of the advanced clones for seed multiplication and germplasm distribution, *in-vitro* plantlets of the clones were sent to FERA. Propagules of six clones which were ELISA-tested locally and found healthy for six viruses viz. PVX, PVY, PVA, PVS, PVM and PLRV were shipped. The clones were tested for (Annex 84)

- a. **Bacteria-** *Ralstonia solanacearum* (Brown rot), *Clavibacter sepedonicus* (Ring rot) and Soft rotting bacteria (*Pectobacterium* & *Dickeya* spp.)
- b. **Viroid:** Potato spindle tuber viroid (PSTVd), Tomato chlorotic dwarf viroid (TCDVd), Tomato planta macho viroid (TPMVd),
- c. **Viruses:** Tobacco Rattle Virus (TRV), Potato mop top virus (PMTV), PVY, Potato leafroll virus (PLRV), PVX, PVS and PVV.

The samples were bulked in five group to reduce the cost of testing. Each of the five bulked samples was screening using immunofluorescence microscopy for the presence of *Clavibacter sepedonicus* and dilution plating on semi-selective media for the detection of *Ralstonia solanacearum*, *Pectobacterium* & *Dickeya* spp. TaqMan PCR testing was done to detect Potato spindle tuber viroid (PSTVd), Tomato chlorotic dwarf viroid (TCDVd), Tomato planta macho viroid (TPMVd), Tobacco Rattle Virus (TRV) and Potato mop top virus (PMTV). ELISA testing was carried out to detect PVY, Potato leafroll virus (PLRV), PVX, PVS and PVV. None of the targeted bacteria, viroid or viruses were isolated/detected in any of the five bulked samples (Figure 9 and 10).

6 *IN-VITRO* MULTIPLICATION OF SELECTED ADVANCED CLONES

Selected advanced clones have been multiplied through in-vitro at the PVFC laboratory. All the selections done in Set 1, 2 and 3 in both lowlands and highlands have been introduced in-vitro for storage and multiplication. Four in-vitro plantlets of each clone have been multiplied. The multiplied stock is being used for fresh seed production as well for germplasm transfer to other countries. Before transferring material or seed multiplication, the in-vitro stock is subjected to disease testing through ELISA testing locally for viruses, and bacteria, and for viruses and viroid in FERA in the UK. The clones which are found disease-free at FERA testing are being used for mini-tuber seed production.

7 GAINING INSIGHT WITH THE POTATO VARIETY REGISTRATION PROCESS

During 2020, amendments in the official variety release procedure and germplasm export regulation were introduced by Vietnamese authorities with significant changes from the old regulations (Annex 85). Some of the important updates are:

- A new law on plant cultivation No 31/2018 has been officially effective on January 1st, 2020 with 7 chapters containing 85 articles. This law replaces the plant variety ordinance No 15/2004. Under the new law, there are six major crops: Rice, Corn, Coffee, Orange, Pomelo and Bananas. Previous seven major crops were Rice, Corn, Peanut, Soybean, Coffee, Orange, Pomelo.
- Potato is not among the major crops and, therefore, does not need VCU trials following the official trial protocols. The VCU trials can be conducted by the self-announcement office.
- As part of the variety release process, there are two types of trials to be conducted, a 27 m² initial trials, and second a 500 m² large trials. Both trials can be done by the applicants and there is no need to coordinate with any government agencies for these.
- Registration of the varieties will be done for the provinces based on the agro-ecologies where the clones have been tested (Annex 86).
- Quality traits like dry matter, reducing sugars and starch content have to be estimated by a lab with the results and stamp of the testing institutes.
- For marker analysis, the same requirement as for quality traits applies. So HZPC testing is valid if it is verified from HZPC on letterhead and with stamp.
- Small, large and DUS can run parallel if enough seeds are available.
- For registration to be applicable to the whole country, the applicant needs to conduct trials in the four agro-zones (RRD, northern midlands and mountainous like Sapa, North Central like Thanh Hoa and Central Highlands, out of the eight agro-zones of Vietnam).

Process of self-announcement-

- The proposing agency submits all required document to the DCP office.
- The DCP office will review the submitted documents.
- Within 5 working days, DCP office will publish the self-announce variety on its DCP website if the documents meet the prescribed requirements.

8 PROCESS OF GERmplasm EXPORT

To initiate the germplasm export process, it is mandatory to have an agreement between the exporting and importing organization, where purpose of the transfer has to be clearly mentioned, which primarily should be for research purpose.

- The proposing institute needs to apply for the export of the germplasm.
- The agreement between the proposing institutes needs to be submitted along with the request.
- After reviewing the request, the DCP office will issue the export permit.
- The proposer needs to bring germplasm to the Plant Protection Department (PPD) for quarantine check based on the importing country requirement. The germplasm needs to be presented along with the issued export permit.
- If the germplasm is free from quarantine pests, the PPD office will issue a phytosanitary certificate. And then the material can be shipped.

9 REVIEW AND UPDATE MEETINGS ON TAP-5 PRODUCT LAUNCH PLAN

During 2020, in addition to the annual review meeting, many online meetings were organized where continuous progress was done for TAP-5 product launch plan. Minutes of these meetings were shared with the participants on regular basis.

1. **11 February 2020; Basel, Switzerland:** Due to COVID-19 outbreak, the annual meeting which originally was planned in Hanoi, had to be shifted to Basel, considering the travelling convenience of the stakeholders. The meeting was physically attended by six participants personally and five virtually.

Important points discussed were:

- Performance of TAP-5 advanced and early clones.
- Development and testing of new population – like the Bacterial Wilt tolerant and LBHT populations.
- Plans for testing of advanced clones in different agro-ecologies in Africa, India and Indonesia.
- Minituber production of advanced clones.
- Development of team for advancement to 6.1 stage.
- The new objectives and activities for the next phase scheduled to start in 2021.

- Compile information on germplasm transfer to the targeted countries.
2. **Online meetings** were organized on 23 March, 23 April 23, 28 May 28, 20 July, 15 September, 22 October and 3 December, where participants from all three organizations were involved. From HZPC, marketing experts (Rian and Jan) took lead for developing the launch road maps. During the meetings important points of discussion were:
 - Results of leading clones were continuously reviewed by presenting the web-graphs and comparing with the leading varieties and targeted profiles.
 - Progress of the project beyond research like germplasm transfer, market identification for the shortlisted clones.
 - Discussion on product advancement for Asia and Africa was carried out. Tony Gathungu from SFSA was representing Africa segment in the online meetings.
 - Updates on the status of minituber production for local evaluation.

10 IMPROVEMENTS

Continuous online discussions resulted in regular modifications and improvements in the ongoing strategies. Some of the suggestions that were followed are:

1. For the shipment to FERA, it was decided to send the sublines other than those shipped to HZPC. The purpose of this was to test the broader range of sublines maintained at PVFC. For all the shortlisted advanced clones, all the sublines at FERA and Dutch authority were found disease-free, confirming the healthy stock of the material maintained *in-vitro*. Sublines refer to each group of *in-vitro* plants multiplied from different mother plants of same clone.
2. Brainstorming on advanced clones changed some of the inconsistent clones to more resilient clones-like HCIP316121.108 was replaced with HCIP316056.220.
3. At the end of the year, all the field clones were reviewed based on their average performance over the years, and disease-resistance ability. Poor-performing clones, particularly those with susceptibility to important diseases were decided to be discarded. These clones were then asked to be removed from the *in-vitro* stock. New clones from Set 3 have been submitted for *in-vitro* multiplication.
4. A population targeting resistance to late blight and tolerance to high temperature is being developed at CIP facilities in Peru, by crossing LBHT population maintained at CIP with pollen imported from HZPC's germplasm.
5. Updated the developed Gantt chart based on the current progress of the project (Annex 87).

11 SUPPORT TO THE NATIONAL PARTNERS

1. Renovation of cold-store facilities
Field Crops Research Institute (FCRI) is partnering with CIP under TAP-5 project since it's initiation for implementing field activities in Red River Delta (RRD). FCRI is the leading institute for potato research

program in lowlands where more than 85% of the total national potato production takes place. Potato in this area is planted only in one season from November to February during winters. To plant potato in next seasons, the harvested seed tubers must be cold stored. While it is a standard practice in the region by farmers, FCRI is also doing same with their research material, including TAP-5 clones. The cold-store in FCRI was built more than 20 years back and needed replacement of AC units, as well renovation of the cold-store room. On the request of FCRI, a financial support has been provided through TAP-5 for the renovation and installation of new AC units. The support will improve the potato research capacity of FCRI and strengthen TAP-5's networking with the local authority in Vietnam, which is very critical for the success of the project. It is also important to mention that we already have been using their cold-storage facilities in first phase of TAP-5 and will be using the renovated facilities in the proposed next phase. Finally, this improved infrastructure would facilitate the development of additional potato research in Vietnam beyond the life cycle of TAP-5 (Figure 11).

2. Development of app

A project team has been set up to include key staff from both CIP and Resonanz to develop a prototype app to collect variety adoption data at lower cost and through a “crowd-sourced” approach. The app will permit efficient monitoring of the adoption of new varieties emerging from breeding investments (including TAP-5 varieties) and as a first step, the app will be trialled on historic and then new “live” data on potato varieties in Kenya (including assessing the uptake of USAID funded varieties introduced into the market through SFSA Seeds2B facilitation) and Peru and also sweetpotato in Mozambique. Variety data lists for all three countries have been assembled and discussions had on data entry design and app layout mock-ups prepared and discussed.

12 INSTITUTIONAL COMMITMENTS/AGREEMENTS

Under the project, two agreements are ongoing with the local partners in Vietnam for implementing field trials- Potato, Vegetable and Flower Research Center (PVFC) and Field Crops Research Institute (FCRI). Both of these agreements were renewed during 2020.

1. Potato, Vegetable and Flower Research Center is maintaining *in-vitro* stock of advanced selected clones in addition to implementing the on-farm trials. The institute has also supported shipment of the material to FERA and HZPC. An agreement between HZPC and PVFC was signed to facilitate germplasm transfer.
2. Field Crops Research Institute is implementing on-farm trials in Red River Delta. Selected clones have been cold stored in the institute's facility. The institute is also supporting in TPS import of new population.

13 MAIN LEARNING POINTS

1. Prior identification of local marketing partners in targeted countries for germplasm import and product launch
2. Development of a processing product matching to Atlantic and combining biotic resistance is still to be achieved. While all the selected advanced clones carry resistance to major biotic stresses, but

consistency for processing traits is missing in the identified processing clones. Despite the rapid genetic progress achieved, breeding process are of recurrent nature, and additional breeding efforts are required to overcome the processing quality of Atlantic. Learning from current experiences, a robust strategy is being formulated to develop/identify clones meeting processing sector's requirements.

3. Germplasm transfer to The Netherlands was relatively easier than prescribed in the local germplasm transfer regulations in Vietnam. Phytosanitary certificate requirement of the importing country were not as complex as were estimated based on the local policies.
4. Minituber production needs to be done at large quantity to get higher amount of tuber seed for conducting large trials at more number locations.
5. Transfer of *in-vitro* plants in possible highest number to initiate the multiplication at faster rate.
6. Improve and extend the schemes in 2021 by evaluating:
 - a. under warmer conditions at lower altitude like Dak Lak
 - b. the bacterial wilt population in a highly infested field in Dalat
 - c. chipping quality after 2 months (cold) storage to have more reliable data against the competitive material.

14 FUTURE PLANS

1. The clones which have been shortlisted to test in different countries, will be shipped from The Netherlands or Vietnam, depending on the logistic convenience. Based on the local requirements in the respective countries, germplasm multiplication and local trials will be initiated.
2. Minituber production of most advanced clones at PVFC will continue to conduct demonstration and variety release trials.
3. Ongoing testing of field selected clones and TPS population in screenhouse will be an important activity for next year.
4. The development of marketing strategies and timelines for product launch will be established through discussions with the marketing teams of SFSA and HZPC.
5. More focused strategies on developing clones closer to Atlantic profile

15 SITES FOR PLANTING POTATO EXPERIMENTS

Potato experiments are being conducted in the following regions and sites:

The field experiments are being conducted in lowlands, midlands and highlands in Vietnam. Red River Delta in Vietnam produces more than 90% of the total national potato production during winter season. Dalat in Lam Dong province provides favorable conditions throughout the year providing opportunities for higher rate of phenotypic selections.

1. Red River Delta (RRD)

- 5–10 masl: Hai Duong and Hai Phong. The sites are around 120 km from Hanoi. Hai Phong is popular for commercial cultivation of Atlantic and provides favorable conditions for potato production during the winter season.

2. Central highland/tropical highland

- 1,500 masl: Dalat in Lam Dong Province of the central highland, 1,495 km from Hanoi, is a tropical highland potato growing region. Due to favorable conditions throughout the year, potato can be produced all year-round.
- 660 m masl: Dak Lak province is in Vietnam's central highlands, which is a warmer region for potato production.

ANNEXES

Annex 1: Male parents from HZPC germplasm used in crossing program to develop LBHT population

Tube code	Progenitor	# tubes	amount of pollen ¹	type G=Granola, A=Atlantic	resistances	RELATIVE YIELD ²	MATURITY 40-90 ³	DORMANCY PERIOD ⁴ 10-90	TUBER SIZE 90 = 70 mm+	SHAPE ⁵	FLESH COLOR ⁶	SKIN COLOR ⁶	OVERALL IMPRESSION ⁷	DM%	COOKING TYPE	SECOND FRY ⁸ 10-90	CRISPS ⁹ 10-90	LATE BLIGHT FOLIAGE ¹⁰ 10-90
HCIP 7031	MERIDA	2	prio1	G	PVY	93	69	59	79	ROO	Y	Y	68	18.0	firm-bit mealy	60		43
HCIP 7033	HZA 11-3013	3	prio2	G		112	83	63	80	O	Y	Y	70	19.3	firm-bit mealy	55		40
HCIP 7039	HO 11-8336	3	prio2	G	PVY	80	55	24	65	OLO	DO	Y	62	20.4	bit mealy	61	45	38
HCIP 7046	HOM 15-7266	2	prio1	A	PVY + LB	121	58	54	81	RO	Y	Y	59	22.4	bit mealy	69	55	99
HCIP 7049	HOM 13-8236	2	prio1	A		126	67	51	82	O	LY	Y	67	21.6	bit mealy	77	67	97
HCIP 7055	HOM 17-6604	2	prio3	G	PVY	125	65	90	80	ROO	Y	Y	68	20.2	bit mealy	78	55	99
HCIP 7058	HOM 17-8558	3	prio1	A		112	65	55	77	RRO	CR	LY	63	22.2	bit mealy	83	75	99
HCIP 7059	HOM 13-7870	3	prio1	G	PVY + LB	91	71	49	82	LO	Y	Y	70	16.6	firm-bit mealy	49	35	85

¹ prio1 refers to most important to pollinate in case of mother plants are rare in flowering, prio2 and prio3 refers to 2nd and 3rd priority for pollination for the same case

² Relative yield 100%: related to the average yield of a set of reference varieties in European trials

³ Maturity: higher is earlier senescence, lower = late

⁴ Dormancy: higher = longer dormancy

⁵ LO=long oval, OLO=oval-long-oval, O=oval, ROO=round-oval-oval, RRO=round-round-oval,

⁶ DY= dark yellow, Y=yellow, LY= light yellow, CR=cream

⁷ Overall impression = the higher= the better general impression

⁸ Second fry: French fries = the higher the better after storage. Protocol that mimics global practice.

⁹ Crisp: the higher the better after storage. Protocol that mimics global practice.

¹⁰ Late blight: the higher the better

Annex 2: Female parents from LBHT population maintained in CIP used in crossing program to develop TAP-5 project LBHT population

#	Clones	Pedigree		Skin color	Flesh color	Tuber shape	Eyes depth	Resistance			Tolerance abiotic stress
		Female parent	Male parent					LB	PVX	PVY	
1	CIP398098.203	CIP393371.58	CIP392639.31	crm	crm	ovl	shll	R		ER	ht, dgth
2	CIP398098.204	CIP393371.58	CIP392639.31	crm/pnk	yllw	elip	shll	R		ER	ht
3	CIP398098.570	CIP393371.58	CIP392639.31	crm	crm	rnd	shll	R	ER		ht
4	CIP398180.289	CIP392657.171	CIP392633.64	crm	crm	ovl	shll	R	ER		ht, dgth
5	CIP398180.292	CIP392657.171	CIP392633.64	crm	crm	obl	shll	R	ER		ht, dgth
6	CIP398190.200	CIP393077.54	CIP392639.2	crm/pnk	crm	obl	shll	R			ht
7	CIP398190.605	CIP393077.54	CIP392639.2	crm/pnk	crm	ovl	shll	R			ht
8	CIP398190.615	CIP393077.54	CIP392639.2	crm	crm	ovl	shll	R	ER		ht
9	CIP398190.89	CIP393077.54	CIP392639.2	crm	crm	ovl	shll	R			ht
10	CIP398192.213	CIP393077.54	CIP392633.54	crm/pnk	crm	ovl	shll	R	ER		ht, dgth
11	CIP398192.553	CIP393077.54	CIP392633.54	crm/pnk	crm	ovl	shll	R	ER		ht
12	CIP398192.592	CIP393077.54	CIP392633.54	crm	crm	ovl/flt	shll	R	ER		ht
13	CIP398193.158	CIP393077.54	CIP392633.64	crm/pnk	crm	ovl	shll	R	ER		ht
14	CIP398193.511	CIP393077.54	CIP392633.64	crm	yllw	elip	shll	R	ER		ht
15	CIP398201.510	CIP393242.5	CIP392633.64	pnk	crm	obl	shll	R	ER	ER	ht
16	CIP398203.5	CIP393280.82	CIP392633.64	red	crm	elip	shll	R	ER		ht
17	CIP398208.219	CIP393371.58	CIP392633.64	crm	crm	elip	shll	R	ER	ER	ht, dgth
18	CIP398208.33	CIP393371.58	CIP392633.64	crm	crm	obl	shll	R	ER		ht, dgth
19	CIP398208.505	CIP393371.58	CIP392633.64	crm/pnk	crm	ovl	shll	R	ER	ER	ht
20	CIP398208.620	CIP393371.58	CIP392633.64	crm	crm	elip	shll	R	ER		ht
21	CIP398208.670	CIP393371.58	CIP392633.64	crm	crm	obl/elip	shll	R	ER	ER	ht
22	CIP302506.39	Bzura	393280.57	ppl	crm	obl	med	R	ER	ER	ht
23	CIP302531.43	CIP393280.82	CIP396272.43	red	yllw	ovl	shll	R	ER		ht
24	CIP302533.38	CIP393371.159	CIP396272.43	crm/pnk	crm	lng	shll	R	ER	ER	ht
25	CIP302533.40	CIP393371.159	CIP396272.43	crm	crm	elip	shll	R	ER	ER	ht
26	CIP302533.46	CIP393371.159	CIP396272.43	crm/pnk	crm	ovl	shll	R	ER	ER	ht
27	CIP302533.48	CIP393371.159	CIP396272.43	crm/pnk	crm	elip	shll	R	ER	ER	ht
28	CIP302533.49	CIP393371.159	CIP396272.43	crm/pnk	crm	lng	shll	R	ER	ER	ht
29	CIP302533.74	CIP393371.159	CIP396272.43	crm	crm	elip	shll	R	ER	ER	ht
30	CIP302534.1	CIP393371.159	CIP396272.18	crm/pnk	crm	lng	shll	R		ER	ht
31	CIP302534.17	CIP393371.159	CIP396272.18	crm	crm	elip	shll	R		ER	ht
32	CIP302551.26	CIP393385.47	CIP396272.8	crm/pnk	yllw	ovl	shll	R	ER	ER	ht
33	CIP304079.10	CIP393075.54	Granola	crm	crm	ovl	shll	R	ER	ER	ht
34	CIP304081.44	CIP393075.54	Monalisa	crm	crm	ovl	shll	R		ER	ht

PVX = Potato Virus X, PVY = Potato virus Y, ER = extreme resistance, T = Tolerant, LB = Late blight, R = Resistant, ht= heat, dgth= drought, rnd=round, elip=elliptical, ovl=oval, obl=oblong, lng=long, crm=cream, wht= white, ylw=yellow, pk=pink, ppl= purple, shl=shallow eyes, med=intermediate

Annex 3: Female parents from LBHT x LTVR population of CIP genepool used in crossing program to develop LBHT population

#	Clones	Pedigree		Skin color	Flesh color	Tuber shape	Eyes depth	Resistance			Tolerance abiotic stress
		Female parent	Male parent					LB	PVX	PVY	
1	CIP312887.075	CIP398098.119	CIP302476.108	red	crm	elip	shll	R	ER	ER	ht
2	CIP312895.056	CIP398208.219	CIP302476.108	crm	crm	obl	shll	R	ER	ER	ht, dght
3	CIP312896.009	CIP398208.29	CIP302476.108	crm	crm	elip	shll	R			ht, dght
4	CIP312896.012	CIP398208.29	CIP302476.108	crm	crm	elip	shll	R	ER	ER	ht
5	CIP312896.025	CIP398208.29	CIP302476.108	crm	crm	elip	shll	R	ER	ER	ht
6	CIP312899.078	CIP398208.67	CIP302476.108	red	yllw	ovl	shll	R	ER	ER	ht
7	CIP312903.013	CIP398098.203	CIP304350.118	red	crm	obl	shll	R			ht, dght
8	CIP312903.066	CIP398098.203	CIP304350.118	crm	crm	obl	shll	R			ht
9	CIP312906.050	CIP398192.213	CIP304350.118	crm/pnk	crm	elip	shll	R		ER	ht
10	CIP312909.046	CIP398203.244	CIP304350.118	red	wht	elip	shll	R			ht, dght
11	CIP312913.022	CIP398208.620	CIP304350.118	crm	crm	elip	shll	R	ER	ER	ht
12	CIP312917.022	CIP398098.119	CIP304372.7	crm	crm	obl	shll	R		ER	ht
13	CIP312918.015	CIP398098.203	CIP304372.7	crm	crm	elip	shll	R			ht
14	CIP312925.108	CIP398208.219	CIP304372.7	crm	crm	elip	shll	R			ht
15	CIP312925.137	CIP398208.219	CIP304372.7	crm	crm	elip	shll	R	ER		ht
16	CIP312928.013	CIP398208.620	CIP304372.7	crm/pnk	crm	obl	shll	R	ER	ER	ht

PVX = Potato Virus X ,PVY = Potato virus Y ,ER = extreme resistance, T = Tolerant, LB = Late blight, R = Resistant, ht= heat, dght= drought, rnd=round, elip=elliptical, ovl=oval, obl=oblong, lng=long,, crm=cream, wht= white, ylw=yellow, pk=pink, ppl= purple, shl=shallow eyes, med=intermediate

Annex 4. Pollen viability testing done on male parents in November 2020

Male	Tube code	Parent code	Main attributes	Percentage of stained pollen	Viability
1	HCIP 7031	MERIDA	Gra, PVY	88.54	High
2	HCIP 7033	HZA 11-3013	Gra	83.16	High
3	HCIP 7039	HO 11-8336	Gra ,PVY	89.34	High
4	HCIP 7046	HOM 15-7266	Atl ,PVY + LB	91.02	High
5	HCIP 7049	HOM 13-8236	Atl	43.90	Low
6	HCIP 7055	HOM 17-6604	Gra PVY	82.40	High
7	HCIP 7058	HOM 17-8558	Atl	71.46	Medium
8	HCIP 7059	HOM 13-7870	Gra, PVY + LB	49.32	Low

G= Granola type, Atl= Atlantic type, PVY = Potato virus Y resistant, LB== Late blight resistant

Annex 5. Berries formation in LBHT crossing program

Sr No.	Male →	HCIP7031	HCIP7039	HCIP7046
	Female↓			
1	CIP312887.075	23		
2	CIP312896.012	9	9	6
3	CIP312896.025	2	4	3
4	CIP312899.078	1	3	
5	CIP312906.050	7		
6	CIP312909.046	6	10	6
7	CIP312918.015	5		
8	CIP312925.108	17	19	13
9	CIP312925.137	13	25	24
10	CIP312928.013	11	6	10
11	CIP398098.203	22	34	13
12	CIP398098.204		7	
13	CIP398098.570	15	7	5
14	CIP398180.289	10	25	14
15	CIP398180.292	2	1	2
16	CIP398190.200	22	10	2
17	CIP398190.605	7	33	5
18	CIP398190.615	3		
19	CIP398190.89	19	20	22
20	CIP398192.213	13	33	20
21	CIP398192.553	13	14	5
22	CIP398192.592	25	36	20
23	CIP398193.158	7		
24	CIP398193.511	13	6	
25	CIP398201.510	24	10	8
26	CIP398203.5	12	16	
27	CIP398208.219	9	15	8
28	CIP398208.33	9	4	11
29	CIP398208.505	2	1	
30	CIP398208.620	10	18	13
31	CIP302506.39	14	4	
32	CIP302531.43	1		
33	CIP302533.38	7	2	5
34	CIP302533.48	13	18	2
35	CIP302533.49	5	11	5
36	CIP302533.74	7	16	1
37	CIP302534.1	10	15	1
38	CIP302534.17	1		
39	CIP302551.26	9	5	5
40	CIP304079.10	5	6	
41	CIP304081.44	5	9	12
	Total berries	408	452	241
	Total Progenies	40	34	27

Annex 6. Five shortlisted promising clones for variety release in Vietnam and germplasm distribution and the three checks.

Sr	Sector	Clone	Strengths	Positive	Weakness
1	HP	HCIP316079.206	LB resistant (1), good yield	Chips ok (good, but needs more confirmation), Medium early (85-90), round tubers, Yellow flesh	Reducing sugar higher range French Fry not so good DM, closer to ATL, but not close enough
2	HF	HCIP316069.204	LB Resistance (2), Low reducing sugar, Early (80-85)	Yield (34.1), Medium tuber wt (86), Yellow skin and flesh, DM	Chipping not consistent
3	H+LF	HCIP316140.210	Very high yield, Round, 3/5 genes present, Good flavor after cooking, LB Resistance (2)	Good ratio of marketable tubers	Dry matter, Chips and FF
4	HF	HCIP316121.108	LB Resistance (2), best ratio of marketable tubers, Low reducing sugar, 3/5 genes present	Big tuber size, Good yield, DM	Poor FF and chips, White skin and flesh
5	HF	HCIP316027.101	LB Resistance (2), Low reducing sugar, Very good appearance	Yield, Yellow flesh and skin	Poor dry matter, Late in maturity
6	LP	Atlantic	Chipping, French fries, reducing sugar, Round tubers, Uniform tubers	White flesh	Late blight susceptible (6), Poor yield under stressed conditions, Needs assured favorable conditions
7	HF	PO3	Moderate virus resistant, Good performer under water logging, Moderate dry matter, Large tuber	Late blight susceptible (6), Poor heat tolerant, Poor yield in our trials	
8	HF	O7	Early medium maturing (85-90)	LB susceptible (6), Poor chips and FF Poor yield under stressed conditions, Virus susceptible	

H= Highland, L= Lowland, P= Processing, F= Fresh, DM= dry matter

Annex 7. Average Dry Matter Yield of the shortlisted promising clones

Sr N°	Clone	Dry matter yield (t/ha)
1	HCIP316079.206	5.69
2	HCIP316069.204	5.92
3	HCIP316140.210	6.90
4	HCIP316121.108	5.36
5	HCIP316027.101	5.51
6	HCIP316056.220	4.84
7	Atlantic	3.46
8	PO3	3.96
9	O7	3.82

Annex 8. Selections' progress under Scheme 1

Sr N°	TS family	TPS received in June 2016	Plants survived in Sep 2016	Feb 17	Oct 17	Dalat June 18	Dalat Nov-Feb 19	Hai Phong Feb 19	Dalat Dec 19	Hai Phong Feb 20	Dalat Sep 20
1	HCIP316002	120	14								
2	HCIP316007	120	18	6							
3	HCIP316008	120	11	2							
4	HCIP316009	120	16	2							
5	HCIP316013	100	14	3							
6	HCIP316014	120	6								
7	HCIP316018	100	12	1							
8	HCIP316019	100	7								
9	HCIP316020	120	22	6							
10	HCIP316039	120	7								
11	HCIP316040	120	12	2							
12	HCIP316041	120	25	4							
13	HCIP316049	120	26	5							
14	HCIP316050	120	5								
15	HCIP316053	120	22	4							
16	HCIP316054	120	17	1							
17	HCIP316055	120	27	1							
18	HCIP316056	120	25	5	1	1	1	1	1		
19	HCIP316057	120	43	13							
20	HCIP316062	120	31	1							
21	HCIP316063	120	67	6							
22	HCIP316064	120	52	3							
23	HCIP316069	120	28	3							
24	HCIP316073	120	28								
25	HCIP316074	120	25	3							
26	HCIP316075	120	42	1							
27	HCIP316079	120	21								
28	HCIP316080	120	17								
29	HCIP316083	120	28	2							
30	HCIP316084	120	33	4							
31	HCIP316085	120	23	4							
32	HCIP316094	120	28	2							
33	HCIP316095	120	42	2							
34	HCIP316100	120	20	3							
35	HCIP316101	120	8								
36	HCIP316102	120	25	2							
37	HCIP316103	120	25	3							
38	HCIP316121	120	81	21	1	1	1		1		1
39	HCIP316125	100	31	4							
40	HCIP316126	120	27	4							
41	HCIP316127	120	11	1							
42	HCIP316132	120	20	6	1	1	1	1	1		
43	HCIP316136	120	27	4	2	1	1	1	1		
44	HCIP316140	120	11	1							
45	HCIP316147	120	17	9	1	1	1	1	1		
46	HCIP316148	120	30	7							
47	HCIP316153	120	70	7							
48	HCIP316163	120	17	9	2	1		1			
49	HCIP316169	120	12								
50	HCIP316170	120	12	14	1						

51	HCIP316172	120	22	1							
52	HCIP316173	120	22	8	1						
53	HCIP316174	120	50	8							
54	HCIP316175	120	51	7							
55	HCIP316177	120	3								
Total		6520	1386	205	10	6	5	5	5	0	1

Annex 9. Selections' progress under Scheme 2 (64 families)

Sr No.	TS family	TPS received in Hai Duong	Plants survived in Hai Duong	Hai Duong	Dalat	Hai Duong	Dalat	Dalat	Hai Phong	Dalat	Dalat	Hai Phong	Dalat	Dalat
		Sep-16	Nov-16	Mar-17	Oct-17	Feb-18	Jun-18	Feb-19	Feb-19	Jun-19	Dec-19	Feb-20	Feb-20	Oct-20
1	HCIP316003	70	16	3										
2	HCIP316006	100												
3	HCIP316015	80												
4	HCIP316017	40	4											
5	HCIP316021	40	21	5										
6	HCIP316023	100												
7	HCIP316026	50												
8	HCIP316027	80	27	10	1	2	1	1			1			
9	HCIP316028	120	6	3										
10	HCIP316033	100												
11	HCIP316034	40	48	16		1			1	1		1	1	
12	HCIP316035	40												
13	HCIP316038	40	24	4		1								
14	HCIP316044	120												
15	HCIP316045	120	32	12	1		1	1			1			
16	HCIP316052	70												
17	HCIP316060	50												
18	HCIP316066	90	10											
19	HCIP316067	50	13	5										
20	HCIP316068	120	12	4										
21	HCIP316070	80	14	3										
22	HCIP316078	120	27	13	2		1	1			1			
23	HCIP316087	120												
24	HCIP316088	120	15	4										
25	HCIP316091	100												
26	HCIP316092	120												
27	HCIP316093	100	37	13										
28	HCIP316097	120	108											
29	HCIP316098	70												
30	HCIP316099	50	20	11		2				1			1	1
31	HCIP316106	120												
32	HCIP316107	80												
33	HCIP316110	120	16	3										
34	HCIP316111	120	19	4		1								
35	HCIP316115	80												
36	HCIP316116	80	30	3		2			2	2		1	1	1
37	HCIP316117	120	18	4										
38	HCIP316118	120	33	4										
39	HCIP316120	120	24	9										
40	HCIP316122	120	6											
41	HCIP316123	80												
42	HCIP316124	40	10											
43	HCIP316130	40												

44	HCIP316131	80												
45	HCIP316133	80	5											
46	HCIP316135	120												
47	HCIP316138	70												
48	HCIP316141	80												
49	HCIP316142	60	15											
50	HCIP316144	120	22	8		2			1	1				
51	HCIP316145	40												
52	HCIP316146	40												
53	HCIP316151	120												
54	HCIP316154	80												
55	HCIP316155	100	7	3										
56	HCIP316156	120												
57	HCIP316157	120												
58	HCIP316158	100												
59	HCIP316159	50												
60	HCIP316164	120												
61	HCIP316165	40												
62	HCIP316166	120	21	6										
63	HCIP316171	100												
64	HCIP316178	120	18	3										
		5640	678	153	4	11	3	3	4	5	3	2	3	2

Annex 10. Selections' progress under Scheme 2 (55 families)

Sr No	TS family	Hai Duong	Dalat	Hai Duong	Dalat	Dalat	Hai Phong	Hai Phong	Dalat	Dalat	Hai Phong	Dalat	Dalat	Dalat
		Mar-17	Oct-17	Feb-18	Jun-18	Feb-19	Feb-19	Feb-19	Jun-19	Dec-19	Feb-20	Feb-20	Sep-20	Oct-20
1	HCIP316002	8												
2	HCIP316007													
3	HCIP316008	2												
4	HCIP316009	7		3			1		1		1	1		
5	HCIP316013													
6	HCIP316014													
7	HCIP316018													
8	HCIP316019													
9	HCIP316020	4												
10	HCIP316039													
11	HCIP316040	4		1			1		1			1		1
12	HCIP316041	10		4			2		2		2	2		1
13	HCIP316049	4		1										
14	HCIP316050	3												
15	HCIP316053	15												
16	HCIP316054	12												
17	HCIP316055	12		2										
18	HCIP316056	28	1	7		1	2		4	1	1	2	1	1
19	HCIP316057	4												
20	HCIP316062													
21	HCIP316063	8	1	1										
22	HCIP316064	7		1										
23	HCIP316069	10	2		1	1		1		1	1		1	
24	HCIP316073	8												
25	HCIP316074													
26	HCIP316075													
27	HCIP316079	6	2		1	2				2			1	
28	HCIP316080	5												

29	HCIP316083													
30	HCIP316084	13												
31	HCIP316085	25												
32	HCIP316094	3												
33	HCIP316095	18		1										
34	HCIP316100	2												
35	HCIP316101													
36	HCIP316102	17		2			1		1					
37	HCIP316103	1												
38	HCIP316121	5							1			1		
39	HCIP316125	5		1										
40	HCIP316126	3		1										
41	HCIP316127													
42	HCIP316132	7		1			1		1		1	1		1
43	HCIP316136	3												
44	HCIP316140	20	3	4	2	2	2	2	1	2	3	1	1	
45	HCIP316147	3												
46	HCIP316148	21		1										
47	HCIP316153													
48	HCIP316163	9												
49	HCIP316169	6		2										
50	HCIP316170	7		1			1		1		1	1		1
51	HCIP316172	8		3			1							
52	HCIP316173													
53	HCIP316174	3		2			1							
54	HCIP316175	7		1										
55	HCIP316177													
Total		343	9	40	4	6	13	3	13	6	10	10	4	5

Annex 11. Selections' progress under Scheme 3 (49 families)

Sr No	TS family	Dalat	Dalat	Dalat	Hai Phong	Dalat	Hai Phong	Dalat
		Oct-17	Jun-18	Feb-19	Feb-19	Dec-19	Feb-20	Sep-20
1	HCIP316002	5						
2	HCIP316007	3	1	1				
3	HCIP316008	2						
4	HCIP316009	7	2	2		1		1
5	HCIP316014	4	2	2				
6	HCIP316020	4	1					
7	HCIP316039	6	2	1				
8	HCIP316040	8	5	3	4	1	2	1
9	HCIP316041	4	2	1		1		1
10	HCIP316049	3	1	1		1		1
11	HCIP316050	4	1					
12	HCIP316053	1						
13	HCIP316054	6	1	1	1			
14	HCIP316055	5	2					
15	HCIP316056	4						
16	HCIP316057							
17	HCIP316062	6						
18	HCIP316063	5	4	3		2		2
19	HCIP316064	4	2					
20	HCIP316069	6	1					
21	HCIP316073	6	1		1			
22	HCIP316074	4	1					

23	HCIP316075							
24	HCIP316079	5	2	1				
25	HCIP316080	1						
26	HCIP316083	1						
27	HCIP316084	2						
28	HCIP316094	2						
29	HCIP316095	1						
30	HCIP316100	2						
31	HCIP316101	6						
32	HCIP316102	12						
33	HCIP316103	2	1					
34	HCIP316121	4	2	1	2		2	
35	HCIP316126	3						
36	HCIP316132	11	5	1	2	1	2	1
37	HCIP316136	3	1	1				
38	HCIP316140	11	4	3	2	1	2	1
39	HCIP316147	4	4	3	1			
40	HCIP316148	2	1					
41	HCIP316153	1						
42	HCIP316163	4	1	1				
43	HCIP316169	8	2	1				
44	HCIP316170	6	5		1		1	
45	HCIP316172	6	1	1				
46	HCIP316173	3	2	1				
47	HCIP316174	11	2	2	1			
48	HCIP316175	3	2		1		1	
49	HCIP316177	13	6	1				
	Total	224	70	32	16	8	10	8

Annex 12: Selections' progress under Scheme 4 (83 families) at Dalat

Sr No.	Clone	Feb-19	Dec-19	Sep-20
1	HCIP317040	63	6	
2	HCIP317041	46	8	4
3	HCIP317044	16	3	1
4	HCIP317048	65	18	2
5	HCIP317050	26		
6	HCIP317055	16		
7	HCIP317062	36	2	
8	HCIP317066	68	2	1
9	HCIP317067	47	4	1
10	HCIP317071	15		
11	HCIP317072	29	4	3
12	HCIP317078	31	2	1
13	HCIP317079	41	4	1
14	HCIP317084	40	1	
15	HCIP317089	20		
16	HCIP317092	46	8	4
17	HCIP317097	48		
18	HCIP317098	54	3	1
19	HCIP317099	19	1	
20	HCIP317103	52	2	1
21	HCIP317105	47	2	
22	HCIP317106	58	5	
23	HCIP317108	52	7	3
24	HCIP317111	42	8	6
25	HCIP317116	50	2	1

26	HCIP317118	60	3	1
27	HCIP317119	11		
28	HCIP317120	63	5	2
29	HCIP317122	44	2	1
30	HCIP317126	65	8	4
31	HCIP317127	69	4	2
32	HCIP317128	40	5	2
33	HCIP317129	43	2	
34	HCIP317131	13	2	
35	HCIP317134	33	7	3
36	HCIP317137	34	1	1
37	HCIP317152	66	9	4
38	HCIP317154	84	5	1
39	HCIP317157	36	6	
40	HCIP317161	39	2	2
41	HCIP317162	44	2	1
42	HCIP317165	80	1	1
43	HCIP317169	64	8	4
44	HCIP317170	43	7	4
45	HCIP317173	25	2	1
46	HCIP317175	47	10	3
47	HCIP317176	52	8	3
48	HCIP317177	68	9	6
49	HCIP317178	84	11	2
50	HCIP317179	50	4	2
51	HCIP317180	45	13	5
52	HCIP317181	38	1	
53	HCIP317185	19	4	4
54	HCIP317187	29	2	1
55	HCIP317191	8		
56	HCIP317195	14	2	
57	HCIP317198	31	8	2
58	HCIP317205	10	1	
59	HCIP317209	47	12	5
60	HCIP317212	35	4	1
61	HCIP317213	35	5	1
62	HCIP317215	55	3	
63	HCIP317216	56	4	
64	HCIP317217	36	9	6
65	HCIP317218	39	2	
66	HCIP317219	39	8	7
67	HCIP317220	53	1	
68	HCIP317221	30	1	
69	HCIP317222	65	3	1
70	HCIP317223	50	3	
71	HCIP317224	44	4	
72	HCIP317225	52	3	2
73	HCIP317226	32	1	1
74	HCIP317227	37	4	3
75	HCIP317228	62	14	8
76	HCIP317229	60	5	2
77	HCIP317230	50	15	10
78	HCIP317231	39	9	8
79	HCIP317232	30	2	2
80	HCIP317240	41	2	
81	HCIP317241	45	2	
82	HCIP317244	43	5	3
83	HCIP317245	37	1	

	Total	3590	368	152
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Annex 13: Total retained clones in 2020 from set 1 and set 2

	Set 1 and 2	Agro-ecology	Sector
1	HCIP316040.204	Highlands	Fresh
2	HCIP316041.205	Both	Fresh
3	HCIP316056.202	Highlands	Fresh/Processing
4	HCIP316056.205	Lowlands	Fresh
5	HCIP316056.220	Highlands	Fresh
6	HCIP316069.204	Both	Fresh
7	HCIP316079.206	Highlands	Fresh
8	HCIP316099.108	Highlands	Fresh/Processing
9	HCIP316116.103	Highlands	Fresh/Processing
10	HCIP316121.108	Highlands	Fresh
11	HCIP316132.205	Highlands	Fresh
12	HCIP316132.207	Lowlands	Fresh
13	HCIP316140.203	Lowlands	Fresh
14	HCIP316140.210	Both	Fresh
15	HCIP316170.202	Both	Fresh
16	VR01-1-2	Both	Fresh

Annex 14: Total retained clones in 2020 from set 3

	Set 3	Agro-ecology	Sector
1	HCIP316009.2	Highlands	Fresh
2	HCIP316040.6	Lowlands	Fresh/Processing
3	HCIP316040.7	Both	Fresh
4	HCIP316041.1	Highlands	Fresh/Processing
5	HCIP316063.2	Highlands	Fresh
6	HCIP316063.4	Highlands	Fresh
7	HCIP316121.1	Lowlands	Fresh/Processing
8	HCIP316121.3	Lowlands	Fresh
9	HCIP316132.5	Both	Fresh/Processing
10	HCIP316140.5	Both	Fresh/Processing
11	HCIP316140.9	Lowlands	Fresh/Processing
12	HCIP316170.1	Lowlands	Fresh/Processing
13	HCIP316175.1	Lowlands	Fresh

Annex 15: Growth traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316069.204	7	3	1
2	HCIP316140.210	7	3	1
3	HCIP316163.101	5	3	1
4	HCIP316056.103	7	3	1
5	HCP316136.101	5	3	1
6	HCIP316132.106	3	3	1
7	HCIP316147.109	3,5,7	3	1
8	HCIP316140.214	5	3	1
9	Atlantic	5	3	1
10	Marabel	3	3	1
11	Solara	5	5	1

Annex 16: Tubers traits of the evaluated clones at farmers' field in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316069.204	2	4	3	3	7	7	7
2	HCIP316140.210	1	1	2	3	9	9	9
3	Atlantic	1	1	2	3	7	7	7
4	Marabel	2	4	4	3	7	7	7
5	Solara	2	4	4	3	7	7	7

Annex 17: Yield and related traits of the selected clones at farmers' field in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316069.204	2.60	5.90	0.231	11.5	88.6	65.6	0.384	19.2
2	HCIP316140.210	3.96	5.70	0.506	25.3	127.8	104.5	0.592	29.6
3	Atlantic	2.08	4.57	0.215	10.8	103.8	79.7	0.341	17.0
4	Marabel	1.49	3.69	0.138	6.89	92.1	61.7	0.225	11.2
5	Solara	1.33	5.27	0.099	4.95	74.2	85.2	0.291	14.6
	SD	0.953	NS	0.152	7.58	19.4	NS	0.123	6.16E
	Variance	0.909		0.023	57.5	377.9		0.015	3.79E+01
	SE	0.508		0.053	2.66	4.87		0.065	3.27
	CD	1.66		0.174	8.69	15.9		0.213	10.7
	CV (%)	38.3		38.8	38.8	8.67		30.9	30.9

Annex 18: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)
1	HCIP316069.204	19.4	0.25
2	HCIP316140.210	15.1	0.25
3	Atlantic	23.2	0.28
4	Marabel	17.4	0.20
5	Solara	18.5	0.29

Annex 19: Growth traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316041.203	7	3	1
2	HCIP316041.205	7	3	1
3	HCIP316056.205	3	3	1
4	HCIP316132.207	7	3	1
5	HCIP316170.202	7	3	1
6	HCIP316102.208	7	3	1
7	Atlantic	5	3	1
8	Marabel	5	3	1
9	Solara	5	3	1

Annex 20: Tubers traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316041.203	2	4	2	2	7	7	7
2	HCIP316041.205	2	4	2	2	7	7	5,7
3	HCIP316056.205	2	4	2	2	7,9	7	9
4	HCIP316132.207	2	4	2	2	7,9	7,9	9
5	HCIP316170.202	2	4	2	2	7	7	7
6	Atlantic	1	1	2	3	7	7	7
7	Marabel	2	4	3	3	7	7	7
8	Solara	2	4	3	3	7	7	7

Annex 21: Yield and related traits of the selected clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316041.203	3.68	7.19	0.315	15.8	85.2	61.2	0.441	22.1
2	HCIP316041.205	3.09	8.28	0.232	11.6	92.9	52.3	0.447	22.3
3	HCIP316056.205	1.88	3.48	0.177	8.85	77.8	58.3	0.235	11.7
4	HCIP316132.207	3.29	6.71	0.375	18.7	115.5	74.8	0.491	24.6
5	HCIP316170.202	2.42	4.45	0.227	11.4	90.4	70.4	0.322	16.1
6	Atlantic	2.78	4.59	0.241	12.0	86.7	68.3	0.315	15.7
7	Marabel	2.26	5.23	0.195	9.77	88.7	56.2	0.293	14.7
8	Solara	3.64	9.86	0.256	12.8	69.0	46.4	0.468	23.4
	SD	NS	1.91	NS	NS	NS	NS	NS	NS
	Variance		3.66						
	SE		1.01						
	CD		3.01						
	CV (%)		30.2						

Annex 22: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)
1	HCIP316041.203	20.7	0.25
2	HCIP316041.205	22.1	0.30
3	HCIP316056.205	16.6	0.21
4	HCIP316132.207	19.5	0.31
5	HCIP316170.202	17.1	0.25
6	Atlantic	23.2	0.28
7	Marabel	17.4	0.20
8	Solara	18.5	0.29

Annex 23: Growth traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316009.203	7	3	1,2
2	HCIP316034.105	7	3	2
3	HCIP316116.103	7	3	2
4	HCIP316140.203	7	3	2
5	HCIP316140.214	5	3	1
6	HCIP316040.204	3	5	1
7	HCIP316174.201	5	3	1
8	HCIP316056.222	5	3	2
9	HCIP316116.102	7	3	1
10	HCIP316144.108	5	3	3
11	HCIP316172.202	5	3	2
12	Atlantic	7	5	1
13	Marabel	5	3	1
14	Solara	7	5	2

Annex 24: Tubers traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316009.203	2	4	2	2	7	9	7
2	HCIP316034.105	2	4	2	2	9	9	9
3	HCIP316116.103	1	3	2	2,3	7,9	9	7,9
4	HCIP316140.203	2	4	2	2	7	7	9
5	HCIP316140.214	2	4	3	2	7	7	7
6	Atlantic	1	1	2	3	7	7	7
7	Marabel	2	4	3	3	7	7	7
8	Solara	2	4	3	3	7	7	7

Annex 25: Yield and related traits of the selected clones in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316009.203	9.50	15.4	0.711	35.6	71.6	58.9	0.950	47.5
2	HCIP316034.105	5.20	6.93	0.560	28.0	107.4	90.8	0.633	31.7
3	HCIP316116.103	6.85	9.50	0.655	32.8	95.8	79.6	0.753	37.7
4	HCIP316140.203	4.25	6.43	0.538	26.9	124.0	95.8	0.620	31.0
5	HCIP316140.214	3.17	10.8	0.247	12.4	79.4	48.6	0.517	25.8
6	Atlantic	4.58	7.30	0.413	20.7	90.7	75.5	0.548	27.4
7	Marabel	2.92	5.92	0.267	13.3	96.3	71.4	0.408	20.4
8	Solara	6.53	13.6	0.458	22.9	67.8	49.1	0.683	34.2
	SD	NS	NS	NS	NS	17.2	17.1	NS	NS
	Variance					294.3	291.5		
	SE					10.5	9.53		
	CD					31.4	28.4		
	CV (%)					14.1	13.1		

Annex 26: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Hai Phong from November 2019 to February 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)
1	HCIP316009.203	18.2	0.30
2	HCIP316034.105	19.6	0.32
3	HCIP316116.103	21.0	0.36
4	HCIP316140.203	18.3	0.30
5	HCIP316140.214	16.3	0.35
6	Atlantic	23.2	0.28
7	Marabel	17.4	0.20
8	Solara	18.5	0.29

Annex 27: Growth traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February,2020

Sr no.	Clones	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316056.103	7	3	1
2	HCIP316069.204	7	3	1
3	HCIP316140.210	7	3	1
4	HCIP316147.109	7	3	1
5	HCIP316132.106	3	3	1
6	Atlantic	3,5,7	3	1
7	Marabel	3	3	1
8	Solara	5	3	1

Annex 28: Yield and related traits of the selected clones in farmers' fields in Hai Phong evaluated from November, 2019 to February, 2020

Sr no.	Genotype	No of marketable tubers /plant	Total no. of tubers /plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316056.10	1.63	5.17	0.167	8.33	103.7	54.5	0.263	13.2
2	HCIP316069.20	3.92	6.80	0.405	20.3	103.3	78.8	0.533	26.7
3	HCIP316140.21	7.17	10.8	0.817	40.8	114.7	90.4	0.967	48.3
4	Atlantic	1.85	4.52	0.213	10.7	115.5	76.1	0.352	17.6
5	Marabel	1.50	5.42	0.129	6.46	83.3	53.4	0.279	14.0
6	Solara	2.69	6.62	0.218	10.9	78.6	56.2	0.376	18.8
	SD	2.07	NS	0.249	12.4	13.3	NS	0.246	12.3
	Variance	4.28		0.062	154.4	177.7		0.061	151.6
	SE	0.710		0.078	3.91	8.08		0.104	5.19
	CD	2.24		0.246	12.3	25.5		0.327	16.4
	CV (%)	39.4		41.7	41.7	14.0		38.9	38.9

Annex 29: Performance of selected clones for dry matter and reducing sugar in farmers' fields in hai phong evaluated from November, 2019 to February, 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)
1	HCIP316069.204	19.4	0.25
2	HCIP316140.210	15.1	0.25
3	Atlantic	23.2	0.28
4	Marabel	17.4	0.20
5	Solara	18.5	0.29

Annex 30: Tubers traits of the evaluated clones in farmers' fields in Dalat from November 2019 to February 2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316034.105	2	4	2	2	7	5,7	7
2	HCIP316056.202	2	3	2	2	7	7	7
3	HCIP316056.226	1	1	2,3	2	5	5	7
4	HCIP316102.208	1	3	2	2	5	5	5
5	HCIP316144.108	1,4	4	3	2	6,7	7	9
6	HCIP316170.202	2	4	2	2	7	7	7
7	Atlantic	1	1	2	2	7	7	7
8	O7	3	3,4	3	2	7	7	7,9
9	PO3	2	3,4	2	2	7	7	5,7

Annex 31: Yield and related traits of the selected clones in farmers' fields in Dalat from November 2019 to February 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316034.105	2.57	6.35	0.354	17.7	133.7	69.0	0.452	22.6
2	HCIP316056.202	3.39	12.17	0.433	21.7	382.5	64.9	0.794	39.7
3	HCIP316056.226	2.61	6.56	0.267	13.3	102.4	59.2	0.388	19.4
4	HCIP316102.208	1.37	6.33	0.123	6.2	82.0	42.3	0.266	13.3
5	HCIP316144.108	2.44	3.94	0.367	18.3	152.3	108.8	0.425	21.3
6	HCIP316170.202	3.70	7.26	0.476	23.8	124.0	80.6	0.596	29.8
7	Atlantic	3.11	5.78	0.306	15.3	95.8	66.0	0.381	19.0
8	O7	3.40	8.33	0.430	21.5	127.3	75.5	0.613	30.7
9	PO3	3.33	8.17	0.381	19.0	116.6	77.8	0.569	28.5
	SD	NS	NS	NS	NS	NS	16.6	0.129	6.47
	Variance						274.4	0.017	41.9
	SE						7.20	0.112	5.60
	CD						21.3	0.332	16.6
	CV (%)						17.4	33.5	33.5

Annex 32: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from November 2019 to February 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Chips Color	French Fry Color	Boiling
1	HCIP316034.105	19.1	0.30	1.1	1.9	2.3
2	HCIP316056.202	21.7	0.33	1.0	1.9	2.3
3	HCIP316170.202	18.5	0.30	1.6	2.3	2.3
4	Atlantic	20.4		1.0	1.0	1.8
5	O7	19.1		1.5	1.9	2.0
6	PO3	19.6		1.7	1.9	1.6

Annex 33: Tubers traits of the evaluated clones in farmers' fields in Dalat from November 2019 to February 2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316040.204	1,2	4	2,3	2	9	7	7,9
2	HCIP316041.203	1	1	3	2	7	7	7
3	HCIP316041.205	2	4	3	2	7	7	9
4	HCIP316099.108	2	4	3	2	9	9	9
5	HCIP316121.202	1	3	2	2	9	9	9
6	HCIP316132.205	2	4	2	2	7	7	9
7	HCIP316140.214	2	4	3	2	7	7	7
8	Atlantic	1	1	2	2	7	7	7
9	O7	3	3,4	3	2	7	7	7,9
10	PO3	2	3,4	2	2	7	7	5,7

Annex 34: Yield and related traits of the selected clones in farmers' fields in Dalat from November 2019 to February 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316009.203	3.16	5.03	0.430	21.5	136.5	104.4	0.514	25.7
2	HCIP316040.204	5.51	8.41	0.710	35.5	129.3	100.6	0.827	41.4
3	HCIP316041.203	4.44	9.65	0.474	23.7	106.4	73.8	0.707	35.4
4	HCIP316041.205	4.18	8.83	0.540	27.0	127.1	83.3	0.758	37.9
5	HCIP316099.108	4.79	6.90	0.569	28.5	119.9	94.0	0.648	32.4
6	HCIP316121.202	5.33	8.60	0.844	42.2	181.8	118.5	0.967	48.4
7	HCIP316132.205	5.54	10.72	0.613	30.6	111.2	73.9	0.791	39.5
8	HCIP316140.214	4.04	8.71	0.444	22.2	110.2	74.6	0.621	31.0
9	LB44-1-4-5	4.36	9.71	0.604	30.2	145.3	84.1	0.804	40.2
10	VR01-1-47	2.97	5.72	0.402	20.1	142.6	94.4	0.519	26.0
11	Atlantic	3.18	5.64	0.367	18.4	115.7	84.0	0.475	23.7
12	O7	3.51	5.92	0.465	23.2	132.4	98.3	0.575	28.8
13	PO3	5.36	10.27	0.659	32.9	122.7	86.5	0.885	44.2
	SD	NS	1.54	0.118	5.90	NS	10.2	0.127	6.37
	Variance		2.38	0.014	34.8		105.0	0.016	40.6
	SE		1.22	0.069	3.44		8.44	0.088	4.39
	CD		3.55	0.200	9.98		24.5	0.255	12.7
	CV (%)		25.3	22.0	22.0		16.5	21.7	21.7

Annex 35: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from November 2019 to February 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Chips Color	French Fry Color	Boiling
1	HCIP316009.203	20.0	0.30			
2	HCIP316040.204	16.1	0.27	1.4	2.4	4.8
3	HCIP316041.205	19.9	0.57	2.1	2.8	4.0
4	HCIP316099.108	20.2	0.31	1.2	2.4	4.0
5	HCIP316121.202	18.5	0.3	1.2	2.3	3.9
6	HCIP316132.205	21.9	0.27	1.5	2.2	3.1
7	HCIP316140.214	17.5	0.37	2.3	2.8	3.8
8	Atlantic			1.0	1.0	2.5
9	O7			1.5	1.9	3.0
10	PO3			1.7	1.9	2.1

Annex 36: Growth traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316027.101	7	5	2
2	HCIP316069.204	7	5	2
3	HCIP316079.206	7	5	2
4	HCIP316121.108	7	7	2
5	HCIP316140.210	7	3	2
6	VR01-1-2	5	7	2
7	ATL	3	7	2
8	O7	7	5	2
9	PO3	5	7	2

Annex 37: Tubers traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316027.101	4	3	3	7	9	9
2	HCIP316069.204	4	3	3	7	9	9
3	HCIP316079.206	4	3	3	7	9	9
4	HCIP316121.108	2	3	3	7	7	7
5	HCIP316140.210	2	2	3	9	7	9
6	VR01-1-2	3	2	3	5	5	7
7	ATL	2	2	3	7	5	5
8	O7	4	2	3	7	7	9
9	PO3	4	3	3	7	5	7

Annex 38: Yield and related traits of the selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316027.1	2.65	5.64	0.353	17.7	132.0	88.1	0.506	25.3
2	HCIP316069.2	2.72	4.15	0.452	22.6	167.6	127.7	0.528	26.4
3	HCIP316079.2	1.86	4.69	0.263	13.1	136.8	81.6	0.394	19.7
4	HCIP316121.1	1.95	5.31	0.223	11.1	109.6	58.8	0.333	16.6
5	HCIP316140.2	3.88	6.20	0.699	35.0	182.9	125.1	0.780	39.0
6	VR01-1-2	1.27	4.96	0.160	8.00	131.5	68.9	0.338	16.9
7	ATL	2.67	4.85	0.338	16.9	129.4	86.1	0.422	21.1
8	O7	1.41	3.95	0.198	9.91	131.9	74.5	0.294	14.7
9	PO3	2.24	5.48	0.188	9.40	85.3	55.9	0.304	15.2
	SD	0.672	NS	0.157	7.85	23.3	23.6	0.139	6.95
	Variance	0.451		0.025	61.7	544.7	555.2	0.019	48.3
	SE	0.432		6.69E-02	3.35	17.2	10.7	6.80E-02	3.40
	CD	1.29		0.201	10.0	51.4	32.1	0.204	10.2
	CV (%)	32.6		36.3	36.3	22.2	21.8	27.2	27.2

Annex 39: Growth traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Clones	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316027.101	7	7	2
2	HCIP316069.204	7	7	2
3	HCIP316079.206	7	7	2
4	HCIP316121.108	7	7	2
5	HCIP316140.210	7	5	2
6	VR01-1-2	5	7	2
7	ATL	3	7	2
8	O7	7	5	2
9	PO3	5	7	2

Annex 40: Tubers traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316027.101	4	3	3	7	9	9
2	HCIP316069.204	4	3	3	7	9	9
3	HCIP316079.206	4	3	3	7	9	7
4	HCIP316121.108	2	3	3	7	7	7
5	HCIP316140.210	2	2	3	9	7	9
6	VR01-1-2	3	2	3	5	5	7
7	ATL	2	2	3	7	5	5
8	O7	4	2	3	7	7	9
9	PO3	4	3	3	7	5	7

Annex 41: Yield and related traits of the selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316027.101	2.40	4.01	0.353	17.7	132.0	99.7	0.424	21.2
2	HCIP316069.204	3.22	6.12	0.469	23.5	160.0	98.6	0.588	29.4
3	HCIP316079.206	2.57	5.40	0.375	18.8	146.5	90.6	0.490	24.5
4	HCIP316121.108	1.93	4.32	0.285	14.3	153.1	89.0	0.385	19.3
5	HCIP316140.210	3.46	8.70	0.576	28.8	164.1	93.7	0.817	40.8
6	VR01-1-2	0.67	3.84	0.081	4.07	122.2	47.6	0.183	9.17
7	ATL	0.00	2.61	0.000	0.00	-	35.5	0.069	3.44
8	O7	1.66	4.14	0.183	9.14	107.1	63.2	0.268	13.4
9	PO3	0.731	5.07	0.064	3.19	86.6	34.5	0.176	8.79
	SD	1.05	NS	0.179	8.93		25.8	0.213	10.6
	Variance	1.11		0.032	79.8		664.6	0.045	113.4
	SE	0.563		8.47E-02	4.24		9.36	0.102	5.12
	CD	1.69		0.254	12.7		28.0	0.307	15.3
	CV (%)	52.7		55.3	55.3		22.4	46.9	46.9

Annex 42: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Chips Color	French Fry Color	Boiling
1	HCIP316027.101	18.3	0.28	1.6	1.6	1.3
2	HCIP316069.204	18.3	0.29	2.1	2.0	1.5
3	HCIP316079.206	17.8	0.36	1.6	1.6	1.7
4	HCIP316121.108	18.1	0.28	2.5	2.3	3.0
5	HCIP316140.210	18.6	0.34	4.0	3.8	3.0
6	ATL	19.0	0.24	1.1	1.1	3.0
7	O7	18.6	0.29	2.0	2.1	2.0
8	PO3	17.6	0.33	1.5	1.9	2.3

Annex 43: Growth traits of the evaluated clones in farmers' fields in Dalat from July to October 2020

Sr no.	Clones	Plant vigor	Senescence at 75 days
1	HCIP316116.103	5,7	7
2	LB44-1-45	7	7
3	VR01-1-47	7	7
4	HCIP316034.105	7	7
5	ATL	3	7
6	O7	7	7
7	PO3	7	7

Annex 44: Tubers traits of the evaluated clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316034.105	4	2	3	7	7	7
2	LB44-1-45	4	2	3	5	5	5
3	ATL	1,2	2	1,3	5,7	5,7	5,7
4	O7	4	3	3	7	7,9	7,9
5	PO3	4	3	3	7	7	7

Annex 45: Yield and related traits of the selected clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316116.103	0.667	3.33	0.167	8.33	250.0	70.4	0.242	12.08
2	LB44-1-45	0.519	4.93	0.041	2.04	83.3	37.1	0.183	9.17
3	VR01-1-47	1.22	4.67	0.061	3.06	50.0	53.6	0.239	11.9
4	ATL	0.750	3.22	0.056	2.78	73.3	42.9	0.147	7.36
5	O7	2.53	4.33	0.361	18.1	153.7	112.1	0.475	23.75
6	PO3	1.87	4.39	0.201	10.1	105.5	74.0	0.316	15.8
	SD	0.735	NS	NS	NS		NS	NS	NS
	Variance	0.54							
	SE	0.402							
	CD	1.31							
	CV (%)	61.2							

Annex 46: Growth traits of the evaluated clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	Plant vigor mode	Senescence at 75 days
1	HCIP316009.203	7	5
2	HCIP316056.202	7	5
3	HCIP316170.202	7	5
4	ATL	3	7
5	O7	7	7
6	PO3	7	7

Annex 47: Tubers traits of the evaluated clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316009.203	4	2	3	7	7	7
2	HCIP316056.202	4	2	3	9	9	9
3	HCIP316170.202	4	2	3	7	7	7
4	ATL	2	2	3	5	5	5
5	O7	4	3	3	7	7	7
6	PO3	4	3	3	7	7	7

Annex 48: Yield and related traits of the selected clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316009.203	3.26	5.67	0.403	20.1	125.4	91.9	0.521	26.0
2	HCIP316056.202	2.82	5.83	0.373	18.7	134.0	99.2	0.562	28.1
3	HCIP316170.202	2.27	4.35	0.276	13.8	121.9	88.9	0.379	19.0
4	ATL	0.00	2.77	0.000	0.0	#NUM!	58.9	0.163	8.17
5	O7	2.16	4.48	0.259	13.0	120.1	82.0	0.366	18.3
6	PO3	1.87	4.39	0.201	10.1	105.5	74.0	0.316	15.8
	SD	1.10	NS	0.141	7.06		12.8	0.141	7.04
	Variance	1.20		0.02	49.8		164.2	0.02	49.6
	SE	0.259		2.99E-02	1.5		7.21	3.15E-02	1.57
	CD	0.815		9.44E-02	4.72		22.7	9.92E-02	1.96
	CV (%)	21.7		20.6	20.6		15.1	14.2	14.2

Annex 49: Growth traits of the evaluated clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	Plant vigor mode	Senescence at 75 days
1	HCIP316040.204	7	7
2	HCIP316041.203	7	5
3	HCIP316041.205	7	5
4	HCIP316099.108	7	5
5	HCIP316121.202	7	5
6	HCIP316132.205	7	5
7	HCIP316140.214	5,7	7
8	ATL	3	7
9	O7	7	7
10	PO3	5	7

Annex 50: Tubers traits of the evaluated clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316040.204	4	3	3	9	9	9
2	HCIP316041.203	4	4	3	7,9	7	7,9
3	HCIP316041.205	4	3	3	9	7	9
4	HCIP316099.108	4	2	3	7,9	7	7,9
5	HCIP316121.202	4	2	3	9	9	7
6	HCIP316132.205	4	2	3	9	9	9
7	HCIP316140.214	4	3	3	5	5	5
8	ATL	2	2	3	5	5	5
9	O7	4	3	3	7	7	7
10	PO3	4	3	3	7	7	7

Annex 51: Yield and related traits of the selected clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316040.204	2.59	4.23	0.409	20.5	157.3	120.0	0.510	25.5
2	HCIP316041.203	1.78	4.37	0.245	12.3	145.8	88.8	0.381	19.1
3	HCIP316041.205	2.97	5.35	0.311	15.6	109.4	86.6	0.453	22.7
4	HCIP316099.108	1.99	3.02	0.308	15.4	153.9	124.1	0.376	18.8
5	HCIP316121.202	3.32	7.09	0.390	19.5	117.4	81.5	0.569	28.5
6	HCIP316132.205	2.30	4.35	0.359	18.0	155.8	108.5	0.485	24.3
7	HCIP316140.214	0.449	7.77	0.029	1.47	65.7	35.1	0.274	13.7
8	ATL	0.333	2.56	0.017	0.833	50.0	48.5	0.122	6.11
9	O7	2.44	4.65	0.350	17.5	142.7	99.1	0.464	23.2
10	PO3	1.56	4.29	0.120	5.99	76.4	50.9	0.222	11.1
	SD	0.91	1.38	0.141	7.06		30.3	0.126	6.31
	Variance	0.829	1.9	0.02	49.9		919	1.59E-02	39.9
	SE	0.437	0.841	4.62E-02	2.31		5.2	6.18E-02	3.09
	CD	1.28	2.47	0.136	6.79		15.3	0.182	9.09
	CV (%)	33.3	32.4	27.2	27.2		10.5	27.9	27.9

Annex 52: Yield and related traits of the selected clones in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype (non-replicated)	Total number of tuber	Total tuber yield (t/ha)	Marketable tuber yield (t/ha)	Average marketable tuber weight (g)	Average tuber weight (g)
1	HCIP316034.105	16.0	18.3	13.3	72.7	68.8
2	ATL	6.33	6.11	0.833	48.5	50.0
3	O7	96.3	23.2	17.5	99.1	142.7
4	PO3	104.7	11.1	5.99	50.9	76.4

Annex 53: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from July to October 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Starch content (%)	Chips Color	French Fry Color	Boiling
1	HCIP316040.204	15.7	0.33	16.23	4.0	3.0	2.2
2	HCIP316041.203	23.6	0.27	18.12	2.6	1.5	1.5
3	HCIP316041.205	21.1	0.33	19.36	3.0	2.9	2.3
4	HCIP316099.108	18.7	0.3	13.05	3.1	2.9	2.5
5	HCIP316121.202	20.3	0.37	24.44	1.1	1.4	1.8
6	HCIP316009.203	18.6	0.37	16.63	3.0	1.9	2.0
7	HCIP316056.202	20.8	0.32	14.29	1.4	1.0	2.5
8	HCIP316170.202	17	0.35	14.22	2.1	2.7	2.5
9	LB44-1-45				1.6	2.2	2.7
10	VR01-1-47				1.9	1.3	3.0
11	HCIP316132.205	20.9	0.3	15.96	2.3	3.2	1.8
12	HCIP316140.214	15.3	0.32	14.09	4.1	3.8	3.0
13	ATL	19.9	0.26	14.54	1.0	1.0	1.7
14	O7	15.2	0.3	15.17	1.5	2.1	1.7
15	PO3	19.7	0.33	14.25	1.4	1.1	1.5

Annex 54: Growth traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February,2020

Sr no.	Genotype	Plant vigor	Senescence	Plant growth habit
1	HCIP316040.6	5	5	1
2	HCIP316040.7	7	3	1
3	HCIP316121.1	7	5	1
4	HCIP316121.3	7	3	1
5	HCIP316132.5	5	3	1
6	HCIP316170.1	7	3	1
7	HCIP316073.3	5	3	1
8	HCIP316040.4	3	3	1
9	HCIP316054.2	3,5,7	3	1
10	HCIP316147.2	5	3	1
11	Atlantic	5	3	1
12	Marabel	7	3	1
13	Solara	5	3	1

Annex 55: Tubers traits of the evaluated clones in farmers' fields in HAI Phong from November 2019 to FEBRUARY,2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316040.6	2	4	3	1	7	7	7
2	HCIP316040.7	1	4	3	2	7	7	9
3	HCIP316121.1	2	4	3	2	9	9	7
4	HCIP316121.3	2	4	3	2	7	7	9
5	HCIP316132.5	1	1	2	2	7	7	7
6	HCIP316170.1	2	4	2	2	5,7,9	7	5,7,9
7	Atlantic	1	1	2	3	7	7	7
8	Marabel	2	4	3	3	7	7	7
9	Solara	2	4	3	3	7	7	7

Annex 56: Yield and related traits of the selected clones in farmers' fields in Hai Phong evaluated from November, 2019 to February, 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316040.6	3.36	5.51	0.358	17.9	104.6	79.8	0.440	22.0
2	HCIP316040.7	5.06	8.78	0.557	27.9	113.4	91.5	0.783	39.2
3	HCIP316121.1	4.95	9.97	0.527	26.3	103.9	75.1	0.763	38.1
4	HCIP316121.3	4.35	7.75	0.487	24.4	108.8	77.7	0.606	30.3
5	HCIP316132.5	4.98	8.88	0.453	22.6	91.8	68.4	0.608	30.4
6	HCIP316170.1	4.14	9.35	0.401	20.0	92.3	64.1	0.614	30.7
7	Atlantic	3.75	6.06	0.347	17.3	93.2	74.4	0.450	22.5
8	Marabel	6.89	10.3	0.589	29.4	85.8	69.8	0.719	35.9
9	Solara	3.30	10.8	0.223	11.1	69.3	44.2	0.481	24.1
	SD	NS	NS	NS	NS	12.2	11.2	NS	NS
	Variance					148.7	124.6		
	SE					6.15	6.59		
	CD					18.4	19.8		
	CV (%)					11.1	15.9		

Annex 57: Performance of selected clones for dry matter and reducing sugar in farmers' fields in hai phong evaluated from November, 2019 to February, 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)
1	HCIP316040.6	20.3	0.25
2	HCIP316040.7	18.9	0.30
3	HCIP316121.1	18.2	0.30
4	HCIP316121.3	17.7	0.21
5	HCIP316132.5	17.2	0.28
6	HCIP316170.1	20.8	0.30
7	Atlantic	23.2	0.28
8	Marabel	17.4	0.20
9	Solara	18.5	0.29

Annex 58: Growth traits of the evaluated clones in farmers' fields in Hai Phong from November 2019 to February,2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316041.203	7	3	1
2	HCIP316132.4	7	3	1
3	HCIP316175.1	7	3	1
4	HCIP316140.9	7	3	1
5	HCIP316174.7	3	5	1
6	HCIP316140.5	3,5,7	3	1
7	HCIP316040.5	7	5	1
8	Atlantic	7	3	1
9	Marabel	7	3	1
10	Solara	5	5	1

Annex 59: Tubers traits of the evaluated clones in farmers' fields in HAI Phong from November 2019 to FEBRUARY,2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316041.203	1	4	3	2	7	7,9	7,9
2	HCIP316132.4	1	3	2	1,2	7	7,9	7
3	HCIP316175.1	2	4	2	2	7	7,9	7
4	Atlantic	1	1	2	3	7	7	7
5	Marabel	2	4	3	3	7	7	7
6	Solara	2	4	3	3	7	7	7

Annex 60: Yield and related traits of the selected clones in farmers' fields in Hai Phong evaluated from November, 2019 to February, 2020

Sr no.	Genotype	No of marketable tubers/ plant	Total no. of tubers/ plant	Marketable tuber weight/ plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/ plant (kg)	Total tuber yield (t/ha)
1	HCIP316041.20	4.20	5.13	0.473	23.7	112.2	100.3	0.513	25.7
2	HCIP316132.4	2.47	9.48	0.242	12.1	99.4	55.5	0.502	25.1
3	HCIP316175.1	2.80	12.0	0.220	11.0	81.0	45.6	0.547	27.3
4	Atlantic	3.80	6.28	0.312	15.6	87.1	72.4	0.447	22.3
5	Marabel	4.67	6.30	0.417	20.8	88.6	77.7	0.492	24.6
6	Solara	1.90	6.20	0.155	7.75	79.7	51.2	0.318	15.9
	SD	0.952	2.26	0.113	5.66	NS	19.5	NS	NS
	Variance	0.907	5.12	0.013	32.0		379.6		
	SE	0.545	1.36	0.046	2.32		6.51		
	CD	1.72	4.30	0.146	7.32		20.5		
	CV (%)	28.6	31.2	26.5	26.5		16.8		

Annex 61: Performance of selected clones for dry matter and reducing sugar in farmers' fields in hai phong evaluated from November, 2019 to February, 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)
1	HCIP316041.203	20.7	0.25
2	HCIP316132.4	16.3	0.30
3	HCIP316175.1	18.5	0.25
4	Atlantic	23.2	0.28
5	Marabel	17.4	0.20
6	Solara	18.5	0.29

Annex 62: Growth traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316009.2	7	7	2
2	HCIP316040.7	7	7	2
3	HCIP316056.103	7	7	2
4	HCIP316079.203	7	5	2
5	HCIP316136.101	7	7	2
6	HCIP316140.214	7	7	2
7	HCIP316140.5	7	5	2
8	HIP316040.7	7	7	2
9	ATL	7	7	2
10	O7	7	7	2
11	PO3	7	7	2

Annex 63: Tubers traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316009.2	9	7	9
2	HCIP316040.7	7	7	9
3	HCIP316056.103	5	7	7
4	HCIP316079.203	9	9	9
5	HCIP316136.101	5	5	7
6	HCIP316140.214	7	7	7
7	HCIP316140.5	7	7	9
8	HIP316040.7	7	7	9
9	ATL	7	9	7
10	O7	7	7	7
11	PO3	7	5,7	7

Annex 64: Yield and related traits of the selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	No of marketable tubers /plant	Total no. of tubers/ plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/ plant (kg)	Total tuber yield (t/ha)
1	HCIP316009.2	2.25	3.55	0.365	18.2	154.2	113.0	0.416	20.8
2	HCIP316040.7	2.78	5.39	0.380	19.0	137.0	86.7	0.467	23.4
3	HCIP316056.103	1.49	4.44	0.117	5.85	83.9	53.4	0.231	11.6
4	HCIP316079.203	3.88	6.28	0.705	35.3	183.7	126.7	0.797	39.9
5	HCIP316136.101	1.50	3.46	0.110	5.48	82.7	45.4	0.159	7.95
6	HCIP316140.214	2.75	6.15	0.227	11.4	80.9	51.5	0.319	15.9
7	HCIP316140.5	2.86	5.65	0.372	18.6	132.1	83.7	0.470	23.5
8	HIP316040.7	1.82	3.09	0.182	9.09	100.0	73.5	0.227	11.4
9	ATL	1.66	2.44	0.160	7.98	93.8	78.4	0.188	9.41
10	O7	2.51	4.73	0.299	14.9	117.9	72.9	0.360	18.0
11	PO3	1.58	3.90	0.144	7.18	91.5	59.9	0.233	11.7
	SE	0.499	0.619	6.92E-02	3.46	12.5	9.68	6.95E-02	3.47
	CD	1.48	1.83	0.205	10.2	37.1	28.7	0.206	10.3

Annex 65: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Chips Color	French Fry Color	Boiling
1	HCIP316009.2	17.8	0.26	2.8	2.5	2.3
2	HCIP316040.7	17.8	0.3	4.0	3.0	2.3
3	HCIP316056.103	18.7	0.33	1.6	1.6	3.2
4	HCIP316079.203	19.0	0.21	3.0	2.3	3.7
5	HCIP316136.101	17.8	0.4	3.5	3.0	3.8
6	HCIP316140.214	17.8	0.34	3.3	3.5	2.5
7	HCIP316140.5	18.6	0.3	2.6	2.5	3.8
8	HIP316040.7	17.8	0.3	4.0	3	2.3
9	ATL	19.0	0.24	1.1	1.1	3.0
10	O7	18.6	0.29	2.0	2.1	2.0
11	PO3	17.6	0.33	1.5	1.9	2.3

Annex 66: Growth traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Clones	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316063.2	7	7	2
2	HCIP316078.106	5	7	2
3	HCIP316132.106	5	7	2
4	ATL	3	7	2
5	O7	7	7	2
6	PO3	5	7	2

Annex 67: Tubers traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316063.2	4	2	3	7	9	9
2	HCIP316078.106	4	2	3	5	5	5
3	HCIP316132.106	4	3	3	5	5	5
4	ATL	2	3	3	7	5	7
5	O7	4	3	3	7	5	7
6	PO3	4	3	3	7	5	7

Annex 68: Yield and related traits of the selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316063.2	3.26	5.28	0.428	21.4	129.0	93.7	0.500	25.0
2	HCIP316078.106	1.14	3.11	0.114	5.69	100.0	60.9	0.178	8.92
3	HCIP316132.106	0.833	3.86	0.070	3.50	82.1	41.3	0.157	7.83
4	ATL	1.03	3.04	0.075	3.75	74.1	45.9	0.137	6.83
5	O7	1.95	3.83	0.214	10.7	106.0	71.5	0.273	13.6
6	PO3	1.26	3.01	0.108	5.39	85.9	57.2	0.166	8.29
	SD	0.856	NS	0.129	6.46	18.0	17.4	0.128	6.38
	Variance	0.733		0.017	41.7	324.3	302.1	0.016	40.7
	SE	0.321		5.05E-02	2.52	9.17	7.68	5.61E-02	2.81
	CD	1.01		0.159	7.96	28.9	24.2	0.177	8.84
	CV (%)	35.3		52.0	52.0	16.5	21.5	41.4	41.4

Annex 69: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Chips Color	French Fry Color	Boiling
1	HCIP316063.2	18.1	0.26	2.3	2.3	2
2	ATL	19.0	0.24	1.1	1.1	3
3	O7	18.6	0.29	2.0	2.1	2
4	PO3	17.6	0.33	1.5	1.9	2.3

Annex 70: Growth traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP316041.1	7	7	2
2	HCIP316045.103	7	7	2
3	HCIP316049.3	7	7	2
4	HCIP316056.220	7	7	2
5	HCIP316063.4	7	7	2
6	HCIP316132.5	7	7	2
7	HCIP316147.109	5	7	2
8	ATL	3	7	2
9	O7	7	7	2
10	PO3	7	7	2

Annex 71: Tubers traits of the evaluated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP316041.1	3	2	3	7	7	7
2	HCIP316045.103	2	3	3	5	5	5
3	HCIP316049.3	2	2	5	9	7	9
4	HCIP316056.220	2	3	3	9	7	9
5	HCIP316063.4	4	3	3	7	7	7
6	HCIP316132.5	3	2	5	9	7	9
7	HCIP316147.109	4	3	3	5	5	7
8	ATL	2	3	3	7	5	7
9	O7	4	3	3	7	5	7
10	PO3	4	3	3	7	5	7

Annex 72: Yield and related traits of the selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP316041.1	4.03	6.03	0.620	31.0	151.9	117.0	0.715	35.7
2	HCIP316045.103	0.621	3.47	0.058	2.89	101.9	41.4	0.138	6.92
3	HCIP316049.3	3.58	6.62	0.452	22.6	126.0	91.4	0.608	30.4
4	HCIP316056.220	2.16	4.18	0.285	14.2	129.1	83.4	0.357	17.8
5	HCIP316063.4	1.82	5.25	0.193	9.65	104.0	53.4	0.285	14.2
6	HCIP316132.5	4.35	10.29	0.536	26.8	123.1	72.5	0.742	37.1
7	HCIP316147.109	0.605	5.08	0.056	2.78	98.1	34.1	0.169	8.47
8	ATL	1.00	3.52	0.084	4.20	84.6	46.8	0.164	8.22
9	O7	2.04	3.89	0.265	13.2	128.0	85.1	0.333	16.7
10	PO3	1.50	3.78	0.104	5.19	68.1	47.3	0.176	8.78
	SD	1.35	2.03	0.201	10.1	21.7	26.1	0.228	11.4
	Variance	1.84	4.14	0.041	101.3	471.9	678.7	0.052	129.9
	SE	0.241	0.494	4.96E-02	2.48	12.3	6.38	5.92E-02	2.96
	CD	0.716	1.47	0.147	7.37	36.6	19.0	0.176	8.79
	CV (%)	19.2	16.4	32.4	32.4	19.1	16.4	27.8	27.8

Annex 73: Performance of selected clones for dry matter and reducing sugar in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Dry matter (%)	Reducing sugar (%)	Chips Color	French Fry Color	Boiling
1	HCIP316041.1	18.5	0.24	1.4	2.3	1.7
2	HCIP316045.103	18.3	0.35	2.3	1.9	4
3	HCIP316049.3	18.7	0.3	1.9	2.4	3.7
4	HCIP316056.220	18.3	0.28	1.1	2.5	4.0
5	HCIP316063.4	18.6	0.29	1.8	1.9	2.5
6	HCIP316132.5	18.1	0.25	2.5	1.6	3.7
7	HCIP316147.109	18.7	0.23	2.5	2.9	2.0
8	ATL	19.0	0.24	1.1	1.1	3.0
9	O7	18.6	0.29	2.0	2.1	2.0
10	PO3	17.6	0.33	1.5	1.9	2.3

Annex 74: Growth traits of the selected replicated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Clones	Plant vigor	Senescence at 75 days	Plant growth habit
1	HCIP317092.15	7	7	2
2	HCIP317092.39	7	7	2
3	HCIP317103.46	7	7	2
4	HCIP317108.3	7	5	2
5	HCIP317108.9	7	5	2
6	HCIP317111.2	7	7	2
7	HCIP317111.24	7	5	2
8	HCIP317111.25	7	7	2
9	HCIP317111.3	7	7	2
10	HCIP317111.40	7	5	2
11	HCIP317126.49	7	5	2
12	HCIP317126.61	7	5	2
13	HCIP317126.7	7	7	2
14	HCIP317152.41	7	7	2
15	HCIP317175.15	7	7	2
16	HCIP317176.8	7	7	2
17	HCIP317177.10	7	7	2
18	HCIP317177.14	7	5	2
19	HCIP317177.20	7	7	2
20	HCIP317180.14	7	7	2
21	HCIP317217.21	7	7	2
22	HCIP317217.28	7	7	2
23	HCIP317217.35	7	7	2
24	HCIP317219.8	7	7	2
25	HCIP317227.32	7	7	2
26	HCIP317228.44	7	7	2
27	HCIP317230.24	7	5	2
28	HCIP317230.36	7	5	2
29	ATL	3	7	2
30	O7	7	7	2
31	PO3	7	7	2

Annex 75: Tubers traits of the selected replicated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber flesh color	Tuber shape	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP317092.15	4	3	7	7,9	7,9
2	HCIP317092.39	2	2	7	7,9	7,9
3	HCIP317103.46	2	3	7	7	7
4	HCIP317108.3	4	2	7	9	9
5	HCIP317108.9	2	2	7	7	7
6	HCIP317111.2	4	3	7	9	9
7	HCIP317111.24	3	2	7,9	7	9
8	HCIP317111.25	4	3	7	7,9	7
9	HCIP317111.3	4	3	9	9	9
10	HCIP317111.40	3	3	7,9	7,9	7,9
11	HCIP317126.49	2	2	7	9	9
12	HCIP317126.61	4	3	7	7	9
13	HCIP317126.7	3	3	7	9	9
14	HCIP317152.41	2	3	7	7	7
15	HCIP317175.15	2,4	2	5,7	5,7	7,9
16	HCIP317176.8	3	3	7	7	7,9
17	HCIP317177.10	4	3	5,7	7	5,7
18	HCIP317177.14	4	3	7	9	9
19	HCIP317177.20	2,4	3	7,9	9	9
20	HCIP317180.14	2	3	7	7	5
21	HCIP317217.21	2,4	4	7,9	9	9
22	HCIP317217.28	2	4	7	7,9	7
23	HCIP317217.35	4	3	7	5,9	7
24	HCIP317219.8	3,4	3	7	7,9	7
25	HCIP317227.32	2,4	2	7	7,9	9
26	HCIP317228.44	3,4	2,3	7	7,9	7
27	HCIP317230.24	3,4	4	7	7,9	7
28	HCIP317230.36	2,3	3	7,9	7,9	9
29	ATL	2	3	7	5	7
30	O7	4	3	7	5	7
31	PO3	4	3	7	5	7

Annex 76: Yield and related traits of the selected replicated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	No of marketable tubers/plant	Total no. of tubers/plant	Marketable tuber weight/plant (kg)	Marketable tuber yield (t/ha)	Average of marketable tuber weight (g)	Average of tuber weight (g)	Total tuber weight/plant (kg)	Total tuber yield (t/ha)
1	HCIP317092.15	2.70	7.60	0.350	17.5	130.7	69.9	0.520	26.0
2	HCIP317092.39	5.50	9.10	0.580	29.0	107.5	74.0	0.670	33.5
3	HCIP317103.46	2.60	6.20	0.230	11.5	89.9	51.2	0.320	16.0
4	HCIP317108.3	3.20	7.80	0.530	26.5	165.6	90.7	0.710	35.5
5	HCIP317108.9	2.30	4.50	0.310	15.5	149.1	91.7	0.380	19.0
6	HCIP317111.2	2.60	5.10	0.330	16.5	129.2	78.3	0.410	20.5
7	HCIP317111.24	3.20	7.10	0.390	19.5	117.5	72.8	0.550	27.5
8	HCIP317111.25	2.90	4.80	0.370	18.5	130.0	95.5	0.450	22.5
9	HCIP317111.3	2.70	4.80	0.320	16.0	118.8	76.7	0.360	18.0
10	HCIP317111.40	4.10	7.00	0.570	28.5	139.6	94.6	0.650	32.5
11	HCIP317126.49	3.30	6.00	0.560	28.0	171.3	118.1	0.660	33.0
12	HCIP317126.61	2.90	6.20	0.490	24.5	168.8	109.4	0.640	32.0
13	HCIP317126.7	3.50	6.30	0.470	23.5	135.8	93.7	0.590	29.5
14	HCIP317152.41	1.90	4.60	0.170	8.50	83.3	48.0	0.240	12.0
15	HCIP317175.15	2.70	7.00	0.400	20.0	144.4	98.5	0.700	35.0

16	HCIP317176.8	2.40	4.60	0.330	16.5	138.9	84.8	0.390	19.5
17	HCIP317177.10	2.30	5.60	0.210	10.5	93.8	57.3	0.320	16.0
18	HCIP317177.14	3.80	4.80	0.630	31.5	157.8	139.8	0.660	33.0
19	HCIP317177.20	3.30	4.40	0.350	17.5	108.1	86.5	0.380	19.0
20	HCIP317180.14	1.80	4.10	0.200	10.0	107.1	66.3	0.280	14.0
21	HCIP317217.21	2.40	3.40	0.230	11.5	96.2	72.5	0.245	12.3
22	HCIP317217.28	2.90	5.40	0.280	14.0	96.4	66.5	0.360	18.0
23	HCIP317217.35	3.10	6.90	0.280	14.0	91.7	60.2	0.410	20.5
24	HCIP317219.8	2.40	5.90	0.230	11.5	95.0	55.6	0.330	16.5
25	HCIP317227.32	5.00	7.30	0.390	19.5	78.2	63.0	0.470	23.5
26	HCIP317228.44	2.00	4.90	0.220	11.0	109.1	62.4	0.300	15.0
27	HCIP317230.24	2.60	4.90	0.230	11.5	91.7	61.1	0.300	15.0
28	HCIP317230.36	1.60	2.20	0.250	12.5	157.3	141.8	0.290	14.5
29	ATL	1.03	3.04	0.075	3.75	74.1	45.9	0.137	6.83
30	O7	1.95	3.83	0.214	10.7	106.0	71.5	0.273	13.6
31	PO3	1.26	3.01	0.108	5.39	85.9	57.2	0.166	8.29
	SD	NS	NS	NS	NS	22.3	17.6	NS	NS
	Variance					497	309.3		
	SE					18.2	19.0		
	CD					52.3	54.6		
	CV (%)					19.8	29.5		

Annex 77: Growth traits of the non-replicated selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Plant vigor mode	Senescence at 75 days	Plant growth habit
1	HCIP317219.13	7	7	2
2	HCIP317041.10	7	5	2
3	HCIP317041.15	7	7	2
4	HCIP317041.23	7	7	2
5	HCIP317041.6	7	7	2
6	HCIP317044.6	7	5	2
7	HCIP317048.48	7	7	2
8	HCIP317048.58	7	7	2
9	HCIP317066.29	7	7	2
10	HCIP317067.24	7	7	2
11	HCIP317072.11	7	7	2
12	HCIP317072.8	7	5	2
13	HCIP317078.24	7	7	2
14	HCIP317079.25	7	7	2
15	HCIP317092.7	7	5	2
16	HCIP317098.42	7	7	2
17	HCIP317111.37	7	7	2
18	HCIP317118.36	7	7	2
19	HCIP317120.27	7	7	2
20	HCIP317120.5	7	7	2
21	HCIP317122.11	7	7	2
22	HCIP317126.45	7	7	2
23	HCIP317127.51	7	7	2
24	HCIP317127.64	7	7	2
25	HCIP317128.15	7	7	2
26	HCIP317128.31	5	7	2
27	HCIP317134.27	7	7	2
28	HCIP317134.31	5	7	2
29	HCIP317134.32	7	7	2
30	HCIP317137.30	7	7	2
31	HCIP317152.25	7	7	2

32	HCIP317152.34	7	7	2
33	HCIP317152.60	7	7	2
34	HCIP317154.2	7	7	2
35	HCIP317161.26	7	7	2
36	HCIP317162.9	7	7	2
37	HCIP317165.45	7	7	2
38	HCIP317169.13	7	7	2
39	HCIP317169.39	7	7	2
40	HCIP317169.4	7	7	2
41	HCIP317169.5	7	7	2
42	HCIP317170.12	7	7	2
43	HCIP317170.15	7	7	2
44	HCIP317170.35	7	7	2
45	HCIP317170.36	7	7	2
46	HCIP317173.3	7	7	2
47	HCIP317175.24	7	5	2
48	HCIP317176.2	7	7	2
49	HCIP317177.2	7	7	2
50	HCIP317177.56	7	7	2
51	HCIP317178.21	7	5	2
52	HCIP317178.44	7	7	2
53	HCIP317179.18	7	7	2
54	HCIP317179.33	7	7	2
55	HCIP317185.16	7	7	2
56	HCIP317185.17	7	7	2
57	HCIP317185.19	7	7	2
58	HCIP317185.3	7	7	2
59	HCIP317187.3	7	7	2
60	HCIP317198.13	7	7	2
61	HCIP317198.16	7	7	2
62	HCIP317209.1	7	7	2
63	HCIP317209.11	7	7	2
64	HCIP317209.22	7	7	2
65	HCIP317209.36	7	7	2
66	HCIP317209.46	7	7	2
67	HCIP317212.26	7	7	2
68	HCIP317217.23	7	7	2
69	HCIP317217.7	7	7	2
70	HCIP317219.20	7	7	2
71	HCIP317219.30	7	7	2
72	HCIP317219.37	7	7	2
73	HCIP317219.38	7	7	2
74	HCIP317219.39	7	7	2
75	HCIP317222.25	7	7	2
76	HCIP317225.20	7	7	2
77	HCIP317225.35	7	7	2
78	HCIP317226.12	7	7	2
79	HCIP317227.30	7	7	2
80	HCIP317227.4	7	7	2
81	HCIP317228.31	7	7	2
82	HCIP317228.33	7	7	2
83	HCIP317228.40	7	7	2
84	HCIP317228.47	7	7	2
85	HCIP317228.58	7	7	2
86	HCIP317229.17	7	7	2
87	HCIP317229.22	7	7	2
88	HCIP317230.18	7	7	2
89	HCIP317230.2	7	7	2

90	HCIP317230.20	7	7	2
91	HCIP317230.25	7	5	2
92	HCIP317230.28	7	5	2
93	HCIP317230.3	7	7	2
94	HCIP317231.1	7	7	2
95	HCIP317231.18	7	7	2
96	HCIP317231.22	7	7	2
97	HCIP317231.25	7	7	2
98	HCIP317231.29	7	7	2
99	HCIP317231.32	5	7	2
100	HCIP317231.33	7	7	2
101	HCIP317231.35	7	7	2
102	HCIP317232.10	7	7	2
103	HCIP317232.13	7	7	2
104	HCIP317244.30	7	7	2
105	HCIP317244.36	7	7	2
106	HCIP317244.41	7	7	2
107	HCIP317072.25	7	7	2
108	HCIP317092.17	7	5	2
109	HCIP317108.41	7	5	2
110	HCIP317161.30	7	7	2
111	HCIP317175.19	7	5	2
112	HCIP317176.3	7	7	2
113	HCIP317177.65	7	7	2
114	HCIP317180.33	7	7	2
115	HCIP317180.36	7	7	2
116	HCIP317180.4	7	7	2
117	HCIP317180.9	7	7	2
118	HCIP317213.6	7	7	2
119	HCIP317217.19	7	7	2
120	HCIP317228.16	7	7	2
121	HCIP317228.18	7	7	2
122	HCIP317230.12	7	7	2
123	HCIP317230.19	7	7	2
124	HCIP317116.16	7	7	2

Annex 78: Tubers traits of the non-replicated selected clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Tuber skin color	Tuber flesh color	Tuber shape	Tuber eye depth	Tuber appearance	Tuber uniformity	Tuber Size
1	HCIP317219.13	1	3	3	3	7	7	7
2	HCIP317041.10	1	3	2	3	7	7	7
3	HCIP317041.15	1	4	2	3	7	7	9
4	HCIP317041.23	1	3	3	3	7	9	7
5	HCIP317041.6	1	4	3	3	9	9	7
6	HCIP317044.6	1	2	2	3	7	9	9
7	HCIP317048.48	1	2	2	3	7	7	7
8	HCIP317048.58	1	2	3	3	9	7	7
9	HCIP317066.29	1	2	2	3	7	7	7
10	HCIP317067.24		3	3		7	7	7
11	HCIP317072.11	1	2	2	3	7	7	7
12	HCIP317072.8	1	3	3	3	9	7	7
13	HCIP317078.24	1	2	5	3	7	7	7
14	HCIP317079.25	1	2	2	3	7	7	7

15	HCIP317092.7		2	2		7	9	9
16	HCIP317098.42		4	3		7	7	5
17	HCIP317111.37		3	3		9	7	9
18	HCIP317118.36		2	2		7	7	7
19	HCIP317120.27	1	2	2	3	7	7	7
20	HCIP317120.5	1	3	2	3	7	7	9
21	HCIP317122.11		2	3		7	7	7
22	HCIP317126.45	1	2	2				
23	HCIP317127.51		4	3		7	7	5
24	HCIP317127.64		4	3		7	7	5
25	HCIP317128.15		2	3		7	7	7
26	HCIP317128.31		4	2		7	9	7
27	HCIP317134.27		3	2		7	7	7
28	HCIP317134.31		3	2		7	7	7
29	HCIP317134.32		3	2		7	7	7
30	HCIP317137.30		3	3		7	9	7
31	HCIP317152.25	1	2	3				
32	HCIP317152.34	1	2	2				
33	HCIP317152.60	1	2	2				
34	HCIP317154.2		3	2		7	7	7
35	HCIP317161.26		2	3		7	7	9
36	HCIP317162.9		2	3		7	7	7
37	HCIP317165.45		2	3		7	7	7
38	HCIP317169.13		4	3		7	5	7
39	HCIP317169.39		4	2		7	9	7
40	HCIP317169.4		3	3		7	7	7
41	HCIP317169.5		4	3		7	7	7
42	HCIP317170.12		4	2		7	9	7
43	HCIP317170.15		4	3		7	9	9
44	HCIP317170.35		4	2		7	7	7
45	HCIP317170.36		4	2		7	7	9
46	HCIP317173.3		4	2		7	7	7
47	HCIP317175.24	2	4	2		9	9	7
48	HCIP317176.2		2	3		7	7	7
49	HCIP317177.2		2	3		7	7	7
50	HCIP317177.56		4	3		7	9	9
51	HCIP317178.21	1	2	2		7	7	9
52	HCIP317178.44		4	2		7	9	9
53	HCIP317179.18		4	3		7	7	7
54	HCIP317179.33		2	3		7	7	7
55	HCIP317185.16		3	5		7	9	9
56	HCIP317185.17		2	2		7	7	7
57	HCIP317185.19		4	2		7	7	7
58	HCIP317185.3		4	2		7	7	7
59	HCIP317187.3		4	3		7	9	7
60	HCIP317198.13		4	2		7	9	9
61	HCIP317198.16		4	3		7	7	7
62	HCIP317209.1		4	5		9	7	7
63	HCIP317209.11		4	3		7	7	7
64	HCIP317209.22		3	3				
65	HCIP317209.36		4	3		7	9	9
66	HCIP317209.46		2	2		7	7	7
67	HCIP317212.26		3	2		7	9	9
68	HCIP317217.23		2	3		7	7	9
69	HCIP317217.7		4	3		7	7	7
70	HCIP317219.20	1	2	3	3	7	7	7
71	HCIP317219.30	1	2	3				
72	HCIP317219.37	1	2	3				
73	HCIP317219.38	1	4	3				
74	HCIP317219.39	1	3	3				

75	HCIP317222.25		4	2		7	7	7
76	HCIP317225.20		4	3		7	9	9
77	HCIP317225.35		4	3		7	7	7
78	HCIP317226.12		3	3		7	7	9
79	HCIP317227.30		4	3		5	7	7
80	HCIP317227.4		3	2		7	7	7
81	HCIP317228.31		2	3		7	7	9
82	HCIP317228.33		4	3		7	9	9
83	HCIP317228.40		2	2		7	7	7
84	HCIP317228.47		2	3		7	7	9
85	HCIP317228.58		4	3		7	7	9
86	HCIP317229.17		3	3		7	9	7
87	HCIP317229.22		3	3		7	9	7
88	HCIP317230.18		4	3		7	9	7
89	HCIP317230.2		3	2		7	7	7
90	HCIP317230.20		3	2		7	7	7
91	HCIP317230.25		2	3		7	7	9
92	HCIP317230.28			2				
93	HCIP317230.3		4	2		7	7	7
94	HCIP317231.1		2	2		7	9	7
95	HCIP317231.18		4	2		7	7	7
96	HCIP317231.22		4	3		9	9	9
97	HCIP317231.25		4	3		7	9	9
98	HCIP317231.29		4	3		5	5	7
99	HCIP317231.32		4	3		7	9	7
100	HCIP317231.33		4	3		7	7	9
101	HCIP317231.35		4	2		7	9	7
102	HCIP317232.10		4	2		7	9	7
103	HCIP317232.13		4	2		7	7	7
104	HCIP317244.30		2	3		7	7	7
105	HCIP317244.36		3	3		7	7	7
106	HCIP317244.41		4	2		7	7	7
107	HCIP317072.25		2	3		7	5	7
108	HCIP317092.17		4	2		7	7	9
109	HCIP317108.41		2	2		7	9	9
110	HCIP317161.30		4	3		7	5	5
111	HCIP317175.19		4	3		7	7	9
112	HCIP317176.3		4	5		7	9	9
113	HCIP317177.65		4	3		7	7	7
114	HCIP317180.33		4	3		7	7	7
115	HCIP317180.36		4	3		7	7	7
116	HCIP317180.4		2	3		7	7	5
117	HCIP317180.9		2	2		7	9	9
118	HCIP317213.6		2	3		7	7	7
119	HCIP317217.19		3	2		7	9	9
120	HCIP317228.16		3	3		7	7	9
121	HCIP317228.18		3	2		7	7	7
122	HCIP317230.12		4	3		7	9	9
123	HCIP317230.19		2	2		7	7	7
124	HCIP317116.16	2	4	2	3	7	7	7

Annex 79: Yield and related traits of the selected non-replicated clones in farmers' fields in Dalat from June to September 2020

Sr no.	Genotype	Total number of tubers	Total tuber yield (t/ha)	Marketable tuber yield (t/ha)	Average marketable tuber weight (g)	Average tuber weight (g)
1	HCIP317219.13	44.0	18.0	13.0	72.2	40.9
2	HCIP317041.15	9.0	8.0	7.0	140.0	88.9
3	HCIP317041.23	18.0	13.0	12.0	100.0	72.2
4	HCIP317041.6	15.0	13.0	12.0	100.0	86.7
5	HCIP317044.6	39.0	36.0	28.0	140.0	92.3
6	HCIP317048.48	11.0	4.0	2.0	66.7	36.4
7	HCIP317048.58	11.0	10.0	9.0	150.0	90.9
8	HCIP317066.29	14.0	7.0	5.0	71.4	50.0
9	HCIP317067.24	20.0	6.0	5.0	50.0	30.0
10	HCIP317072.11	24.0	12.0	10.0	83.3	50.0
11	HCIP317072.8	32.0	36.0	28.0	200.0	112.5
12	HCIP317078.24	23.0	12.0	9.0	81.8	52.2
13	HCIP317079.25	21.0	12.0	7.0	87.5	57.1
14	HCIP317092.7	45.0	54.0	49.0	153.1	120.0
15	HCIP317098.42	17.0	6.0	5.0	83.3	35.3
16	HCIP317111.37	13.0	13.0	12.0	133.3	100.0
17	HCIP317118.36	15.0	9.0	8.0	88.9	60.0
18	HCIP317120.27	21.0	13.0	9.0	90.0	61.9
19	HCIP317120.5	17.0	21.0	17.0	340.0	123.5
20	HCIP317122.11	36.0	12.0	5.0	55.6	33.3
21	HCIP317126.45	12.0	14.0	14.0	116.7	116.7
22	HCIP317127.51	32.0	10.0	4.0	50.0	31.3
23	HCIP317127.64	26.0	9.0	5.0	71.4	34.6
24	HCIP317128.15	21.0	16.0	15.0	100.0	76.2
25	HCIP317128.31	28.0	20.0	19.0	105.6	71.4
26	HCIP317134.27	19.0	7.0	3.0	75.0	36.8
27	HCIP317134.31	35.0	12.0	7.0	58.3	34.3
28	HCIP317134.32	30.0	14.0	5.0	100.0	46.7
29	HCIP317137.30	18.0	11.0	8.0	88.9	61.1
30	HCIP317152.25	35.0	9.0	6.0	46.2	25.7
31	HCIP317152.34	18.0	11.0	8.0	88.9	61.1
32	HCIP317152.60	14.0	4.0	3.0	50.0	28.6
33	HCIP317154.2	26.0	12.0	9.0	64.3	46.2
34	HCIP317161.26	24.0	12.0	8.0	88.9	50.0
35	HCIP317162.9	30.0	13.0	8.0	88.9	43.3
36	HCIP317165.45	36.0	20.0	5.0	50.0	55.6
37	HCIP317169.13	35.0	12.0	7.0	77.8	34.3
38	HCIP317169.39	25.0	15.0	13.0	108.3	60.0
39	HCIP317169.4	37.0	12.0	8.0	80.0	32.4
40	HCIP317169.5	55.0	16.0	8.0	57.1	29.1
41	HCIP317170.12	15.0	14.0	11.0	122.2	93.3
42	HCIP317170.15	28.0	31.0	27.0	142.1	110.7
43	HCIP317170.35	24.0	17.0	12.0	100.0	70.8
44	HCIP317170.36	44.0	37.0	28.0	127.3	84.1
45	HCIP317173.3	57.0	43.0	19.0	86.4	75.4
46	HCIP317175.24	22.0	21.0	18.0	150.0	95.5
47	HCIP317176.2	17.0	8.0	4.0	66.7	47.1
48	HCIP317177.2	44.0	17.0	9.0	60.0	38.6
49	HCIP317177.56	47.0	43.0	37.0	137.0	91.5
50	HCIP317178.21	27.0	20.0	15.0	125.0	74.1
51	HCIP317178.44	22.0	27.0	25.0	178.6	122.7
52	HCIP317179.18	31.0	19.0	13.0	118.2	61.3
53	HCIP317179.33	22.0	13.0	9.0	100.0	59.1

54	HCIP317185.16	19.0	31.5	31.0	182.4	165.8
55	HCIP317185.17	19.0	12.0	9.0	90.0	63.2
56	HCIP317185.19	23.0	16.0	11.0	100.0	69.6
57	HCIP317185.3	34.0	16.0	13.0	59.1	47.1
58	HCIP317187.3	38.0	18.0	10.0	83.3	47.4
59	HCIP317198.13	20.0	27.0	22.0	183.3	135.0
60	HCIP317198.16	11.0	8.0	8.0	80.0	72.7
61	HCIP317209.1	30.0	15.0	8.0	88.9	50.0
62	HCIP317209.11	29.0	14.0	8.0	80.0	48.3
63	HCIP317209.22	48.0	20.0	12.0	66.7	41.7
64	HCIP317209.36	22.0	13.0	10.0	90.9	59.1
65	HCIP317209.46	27.0	13.0	10.0	76.9	48.1
66	HCIP317212.26	23.0	43.0	40.0	210.5	187.0
67	HCIP317217.23	49.0	47.0	35.0	184.2	95.9
68	HCIP317217.7	23.0	15.0	14.0	87.5	65.2
69	HCIP317219.20	31.0	14.0	8.0	72.7	45.2
70	HCIP317219.30	27.0	17.0	13.0	86.7	63.0
71	HCIP317219.37	23.0	9.0	7.0	53.8	39.1
72	HCIP317219.38	26.0	12.0	9.0	75.0	46.2
73	HCIP317219.39	37.0	17.0	16.0	57.1	45.9
74	HCIP317222.25	30.0	11.0	8.0	57.1	36.7
75	HCIP317225.20	30.0	23.0	19.0	105.6	76.7
76	HCIP317225.35	21.0	13.0	9.0	90.0	61.9
77	HCIP317226.12	19.0	12.0	10.0	125.0	63.2
78	HCIP317227.30	19.0	10.0	5.0	125.0	52.6
79	HCIP317227.4	10.0	4.5	4.0	50.0	45.0
80	HCIP317228.31	16.0	18.0	14.0	175.0	112.5
81	HCIP317228.33	18.0	15.0	12.0	120.0	83.3
82	HCIP317228.40	28.0	12.0	11.0	44.0	42.9
83	HCIP317228.47	22.0	27.0	25.0	147.1	122.7
84	HCIP317228.58	17.0	12.0	10.0	125.0	70.6
85	HCIP317229.17	28.0	29.0	25.0	147.1	103.6
86	HCIP317229.22	23.0	20.5	20.0	111.1	89.1
87	HCIP317230.18	33.0	23.0	20.0	90.9	69.7
88	HCIP317230.2	26.0	20.0	14.0	116.7	76.9
89	HCIP317230.20	17.0	13.0	8.0	133.3	76.5
90	HCIP317230.25	37.0	36.0	33.0	117.9	97.3
91	HCIP317230.28	33.0	21.0	16.0	100.0	63.6
92	HCIP317230.3	19.0	10.0	6.0	85.7	52.6
93	HCIP317231.1	21.0	15.0	13.0	108.3	71.4
94	HCIP317231.18	26.0	9.0	5.0	62.5	34.6
95	HCIP317231.22	24.0	30.1	30.0	150.0	125.4
96	HCIP317231.25	22.0	22.0	20.0	153.8	100.0
97	HCIP317231.29	33.0	12.0	9.0	75.0	36.4
98	HCIP317231.32	16.0	6.0	5.0	71.4	37.5
99	HCIP317231.33	11.0	11.0	11.0	100.0	100.0
100	HCIP317231.35	11.0	10.1	10.0	125.0	91.8
101	HCIP317232.10	30.0	16.0	15.0	75.0	53.3
102	HCIP317232.13	49.0	26.0	18.0	81.8	53.1
103	HCIP317244.30	31.0	16.0	9.0	100.0	51.6
104	HCIP317244.36	33.0	28.0	23.0	115.0	84.8
105	HCIP317244.41	28.0	20.0	15.0	100.0	71.4
106	HCIP317072.25	24.0	16.0	10.0	111.1	66.7
107	HCIP317092.17	32.0	40.0	35.0	166.7	125.0
108	HCIP317108.41	23.0	27.0	24.0	141.2	117.4
109	HCIP317161.30	44.0	14.0	5.0	62.5	31.8
110	HCIP317175.19	46.0	33.0	22.0	137.5	71.7
111	HCIP317176.3	31.0	35.0	31.0	134.8	112.9
112	HCIP317177.65	39.0	35.0	30.0	115.4	89.7
113	HCIP317180.33	37.0	21.0	11.0	100.0	56.8

114	HCIP317180.36	21.0	14.0	10.0	100.0	66.7
115	HCIP317180.4	32.0	15.0	5.0	83.3	46.9
116	HCIP317180.9	19.0	26.0	23.0	209.1	136.8
117	HCIP317213.6	19.0	13.0	10.0	111.1	68.4
118	HCIP317217.19	33.0	35.0	27.0	142.1	106.1
119	HCIP317228.16	21.0	20.0	17.0	154.5	95.2
120	HCIP317228.18	44.0	14.0	5.0	62.5	31.8
121	HCIP317230.12	27.0	16.0	10.0	125.0	59.3
122	HCIP317230.19	24.0	7.0	3.0	50.0	29.2
123	ATL	21.0	7.0	4.0	74.1	45.9
124	O7	34.0	14.0	11.0	106.0	71.5
125	PO3	24.0	8.0	5.0	85.9	57.2

Annex 80: Scale used for measuring qualitative traits and disease resistance

Senescence	1=very late, 3=late, 5 = medium, 7 =early , 9= Very early
Plant growth habit	1= erect, 2= semi-erect, 3 = Decumbent, 4 = Prostrate, 5 = Semi-rosette, 6 = Rosette
Leaf type	1= ugly, 2=acceptable, 3= very good
Plant vigor	1= very weak, 3=weak, 5 = medium, 7 = vigorous, 9 = very vigorous
Tuber appearance	1= very poor, 3= poor, 5= regular, 7= good, 9= very good
Tuber uniformity	1= very heterogenous, 3= heterogenous, 5= intermediate, 7=uniform, 9= very uniform
Tuber size	1=very small (<2cm), 3=small (2-4cm), 5=medium (4-6cm), 7=large (6-9 cm), 9= very large (over 9 cm)
Tuber shape	1= Compressed, 2= Rounded, 3= Ovoid, 4= Obovoid,5= Elliptical,6= Oblong, 7= Long-oblong,8= Elongated
Predominant tuber skin color	1=white-cream, 2=yellow, 3=orange, 4=brownish, 5 = Pink, 6 = Red, 7 = Purplish-red, 8 = Purple, 9 = Blackish
Tuber flesh color	1 = White, 2=cream, 3=pale yellow, 4=yellow, 5 = Intense Yellow, 6 = Red,7 = Purple, 8 = Violet
Tuber eyes depth	1 = Protruding, 3= shallow, 5=slightly deep, 7= deep, 9= very deep
Chips color	1= Light, 2= Moderately light, 3= Moderately dark, 4= Dark, 5= Very dark
French Fry	1= Light, 2= Moderately light, 3= Moderately dark, 4= Dark, 5= Very dark
Flavor (Boiling)	1= best, 2=good, 3= interim, 4= poor, 5= poorest
Late blight	1 = Extreme Resistance (ER), 2 = Resistant (R), 3 = Moderately Resistant (MR), 4 = Moderately susceptible (MS), 5 = Susceptible (S), 6 = Highly Susceptible (HS)
DNA Analysis	0= Resistance Absent, 1= Resistant present

Annex 81: Bacterial wilt population received from Lima, Peru

Sr No.	Family Accession Number	Female Accn	Female Code	Male Accn	Male Code	Received
1	CIP319019	CIP509509.1	9509.1	HCIP7024	MERIDA	160
2	CIP319034	CIP509506.2	9506.2	HCIP7024	MERIDA	250
3	CIP319020	CIP509510.1	9510.1	HCIP7024	MERIDA	250
4	CIP319008	CIP509506.3	9506.3	HCIP7024	MERIDA	250
5	CIP319040	CIP509509.6	9509.6	HCIP7024	MERIDA	250
6	CIP319027	CIP509510.3	9510.3	HCIP7024	MERIDA	250
7	CIP319031	CIP509509.1	9509.1	HCIP7049	HOM 15-7266	250
8	CIP319004	CIP509510.1	9510.1	HCIP7049	HOM 15-7266	250
9	CIP319009	CIP509506.3	9506.3	HCIP7049	HOM 15-7266	250
10	CIP319033	CIP509506.2	9506.2	HCIP7049	HOM 15-7266	250
11	CIP319041	CIP509509.6	9509.6	HCIP7049	HOM 15-7266	250
12	CIP319007	CIP509510.3	9510.3	HCIP7049	HOM 15-7266	250
13	CIP319036	CIP509506.2	9506.2	HCIP7064	HOM 13-8226	191
14	CIP319016	CIP509506.3	9506.3	HCIP7064	HOM 13-8226	250
15	CIP319014	CIP509510.1	9510.1	HCIP7064	HOM 13-8226	250
16	CIP319037	CIP509509.6	9509.6	HCIP7064	HOM 13-8226	250
17	CIP319024	CIP509510.3	9510.3	HCIP7064	HOM 13-8226	250
18	CIP319010	CIP509501.2	9501.2	HCIP7098	HZD 08-1059	16
19	CIP319003	CIP509509.1	9509.1	HCIP7098	HZD 08-1059	50
20	CIP319022	CIP509510.1	9510.1	HCIP7098	HZD 08-1059	250
21	CIP319030	CIP509506.3	9506.3	HCIP7098	HZD 08-1059	250
22	CIP319026	CIP509506.2	9506.2	HCIP7098	HZD 08-1059	250
23	CIP319043	CIP509509.6	9509.6	HCIP7098	HZD 08-1059	250

24	CIP319015	CIP509510.3	9510.3	HCIP7098	HZD 08-1059	250
25	CIP319039	CIP509510.3	9510.3	HCIP8033	HO 11-8336	14
26	CIP319038	CIP509509.6	9509.6	HCIP8033	HO 11-8336	37
27	CIP319018	CIP509506.3	9506.3	HCIP8033	HO 11-8336	39
28	CIP319001	CIP509510.1	9510.1	HCIP8033	HO 11-8336	200
	Total					5707

Annex 82: HZPC population received from The Netherlands

Sr No	Family code	TPS received	Type	Dry matter%
1	HCIP20161	1060	Fresh	20.0
2	HCIP20181	330	Processing	22.3
3	HCIP20269	330	Fresh	19.2
4	HCIP20270	270	Processing and fresh	20.7
5	HCIP20279	96	Processing	21.7
6	HCIP20310	330	Fresh	20.2
7	HCIP20390	155	Processing	21.7
8	HCIP20590	330	Processing and fresh	20.7
9	HCIP20603	201	Fresh	20.6
10	HCIP20604	215	Fresh	19.2
11	HCIP20606	299	Fresh	20.2
12	HCIP20694	660	Processing	22.1
	TOTAL	4276		

Annex 83: Shipment of advanced clones to HZPC, The Netherlands.

Sr No	Clone	Number of tubes	Healthy after quarantine
1	HCIP316027.101	3	Yes
2	HCIP316056.103	2	Yes
3	HCIP316056.220	2	All died
4	HCIP316069.204	3	Yes
5	HCIP316079.206	3	Yes
6	HCIP316121.108	2	Yes
7	HCIP316140.210	3	Yes
8	VR-1-1-2	2	All died
	Total	20	

Annex 84 : Health tests conducted on the advanced clones at FERA, UK.

Sr No	Name	Method
Bacteria		
1	<i>Clavibacter sepedonicus</i>	Immunofluorescence microscopy
2	<i>Ralstonia solanacearum</i>	Dilution plating on semi-selective media
3	<i>Pectobacterium</i> & <i>Dickeya</i> spp	Dilution plating on semi-selective media
Viroid and Viruses		
4	Potato spindle tuber viroid (PSTVd), Tomato chlorotic dwarf viroid (TCDVd), Tomato planta macho viroid (TPMVd), Tobacco Rattle Virus (TRV) and Potato mop top virus (PMTV)	TaqMan
5	PVY, Potato leafroll virus (PLRV), PVX, PVS and PVV	ELISA

Annex 85 : Difference in old and new regulations of variety registration for potato in Vietnam.

Term	Old policy	New policy
VCU trials	Conducted by trial office (contracted, fees, samples, documents...)	Conducted by applicant (Save times, fees, and approval process...)
VCU trial types	Small scale, Large scale, testing production	Small scale go along with demonstrations, no need testing production of 50 ha trials
Review & approval by the evaluation committee	2 times (local and national committees)	Self-implementation by the seed release office
Geographic region to be tested for VCU & testing production	At least 2 provinces for each eco-geography region.	More flexibility, trials conducted in Dalat can be registered for use in central highland or within Lam Dong province, only.
Registration times	At least 4–5 years	About 2 years of time
Characteristics of variety	Approved by the national evaluation committee after review of VCU & Testing production results	Announced by seed release office. Proposer needs to take full responsibility for their seed characteristics & performance in practice production.
Registration approval	By Minister of MARD after review by national evaluation committee & reported by DCP	Self-announcement by seed release office after published on DCP website.
Publishing of registered varieties	A list of registered varieties is published on MARD website after approval decisions by Minister of MARD	Only approval decisions or self – announcements are published on MARD or DCP website

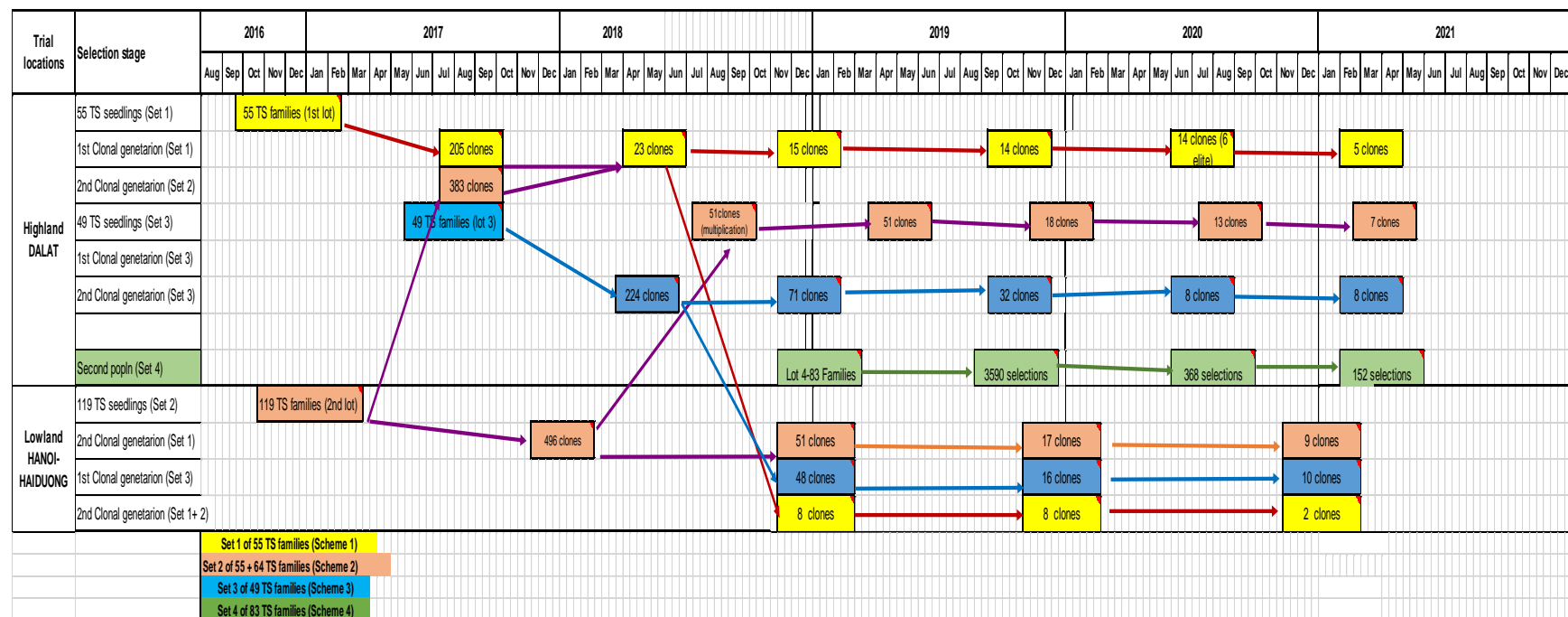
Annex 86 : Detailed requirement of small and large trials for variety registration according to the zones in Vietnam.

	One province (like Hai Phong in RRD)	Agro-ecologies based (like RRD or Central Highland or both)	Lam Dong (special case where can be grown round the year)
Small scale (27m²)			
Locations	One location is enough	One location/ province. At least two provinces per agro-zone, so it means two locations. If for Central Highlands+ RRD, then two locations in two provinces each, that means total 4 locations of four provinces to cover Central Highlands +RRD	One
Same/ different Location	Any	Different	Any
Seasons	If announce for one season- Two same seasons in different years. But If announce for three seasons or other seasons- conduct three trials in one location over two calendar years with two same seasons and one different season	Announce for one season- Two same seasons in different years (where it is annual crop); If announce for three seasons or other seasons- conduct three seasons trials in one location over two years	Three seasons in same year is sufficient. They can be in two different years also. Jan-April and Feb-May will be different season as planting months are different

Total trials	Two trials if for one season and three trials if for more seasons	Eight trials for Central Highlands +RRD if announced for one season (e.g. Nov-Feb). Four trials for Central Highlands or RRD if for one season. For other or three seasons total trials would be six (3 seasons in two locations and these trials can take place in one cropping year)	Three trials in three seasons
Large scale (500m²)			
Locations	Minimum two locations. But for reliable data need three locations if possible	Central Highlands or RRD- One location per province and total minimum three locations in two provinces (better if they are three locations in three provinces). Central Highlands +RRD- One location per province and total minimum three locations in two provinces in each agro-zone, that makes it six locations in total for both. Though it is good to conduct trials in three provinces acc to TCVN (<u>instead of 2</u>) for three locations for better estimates	Two
Same/ different Locations	Different	Different	Different
Seasons	Two seasons in same cropping year for both the cases of announcement of one or more seasons. We also can have one extra trial in main season for our internal reference.	Two seasons in same cropping year. We also can have one extra trial in main season (Nov 20-Feb 21) for our internal reference.	Two different seasons
Total trials	Total Four trials in two locations. If sufficient seed available for same cropping year.	RRD or Central Highlands- six trials can be done in same cropping year spreading over two calendar years as they are for three locations in two or three provinces. If RRD+ Central Highlands- total 12 trials and they also can be done in same cropping year over two calendar years.	Total four trials in two locations, can be done in same calendar year also

Annex 87. Updated Gantt chart

Time schedule for field and screenhouse trials of TAP-5 trials



FIGURES

Figure 1: Graphical representation of HCIP316079.206, checks and targeted fresh product profile based on average performance in the field trials and processing traits evaluation (1= poorest, 5= best)

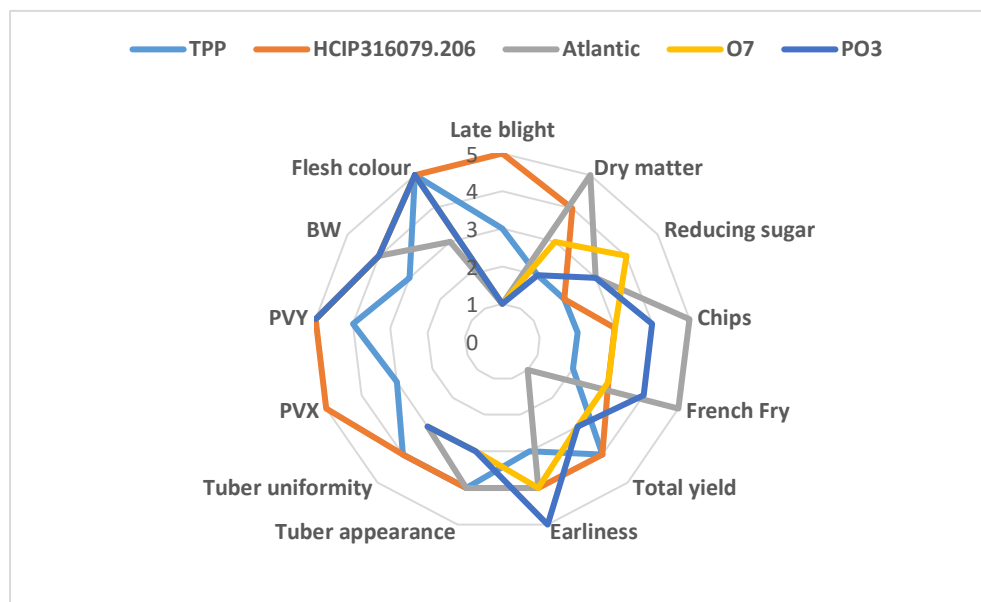


Figure 2: Graphical representation of HCIP316069.204, checks and targeted fresh product profile based on average performance in the field trials and processing traits evaluation (1= poorest, 5= best)

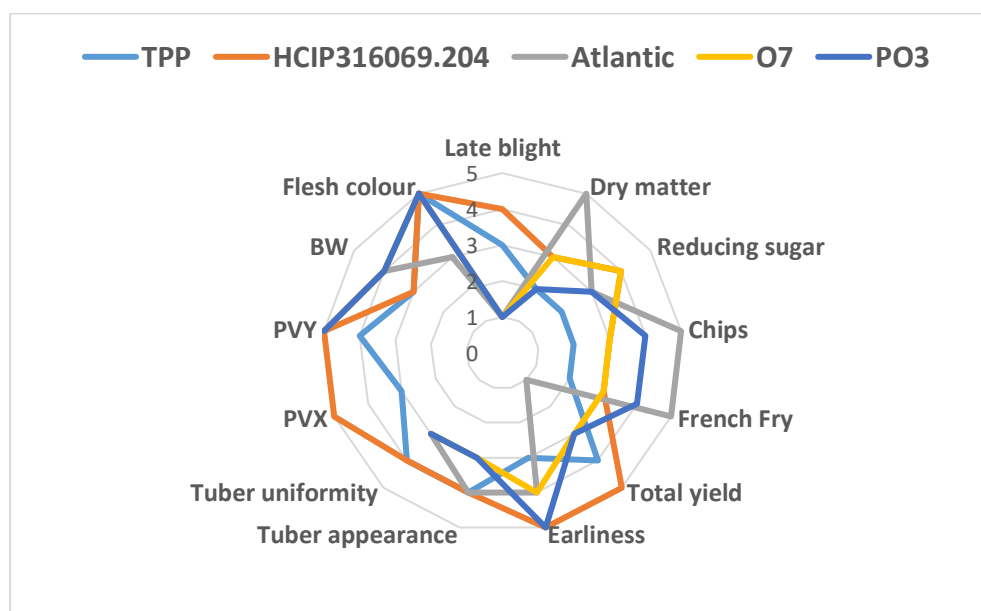


Figure 3: Graphical representation of HCIP316140.210, checks and targeted fresh product profile based on average performance in the field trials and processing traits evaluation (1= poorest, 5= best)

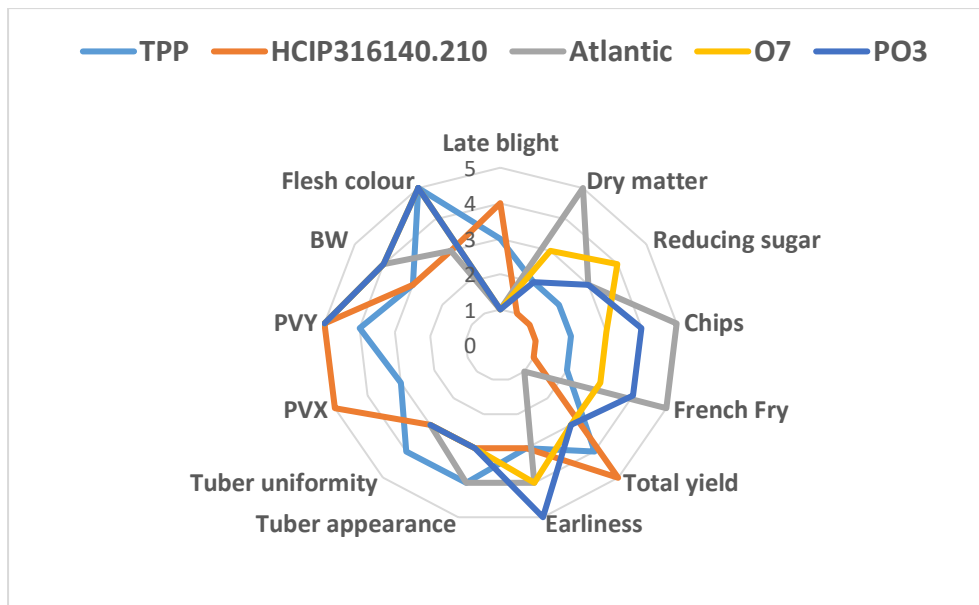


Figure 4: Graphical representation of HCIP316121.108, checks and targeted fresh product profile based on average performance in the field trials and processing traits evaluation (1= poorest, 5= best)

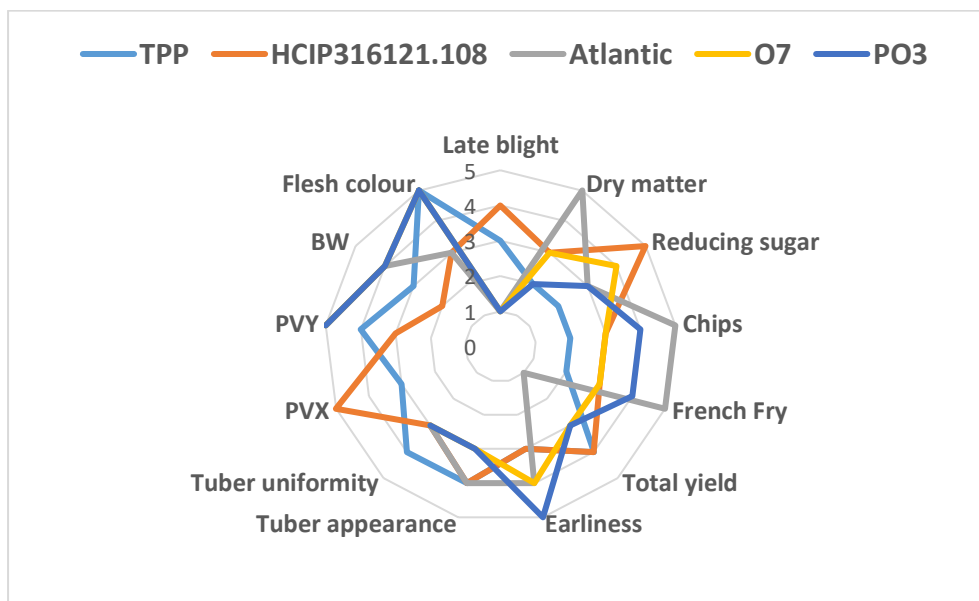


Figure 5: Graphical representation of HCIP316027.101, checks and targeted fresh product profile based on average performance in the field trials. and processing traits evaluation (1= poorest, 5= best)

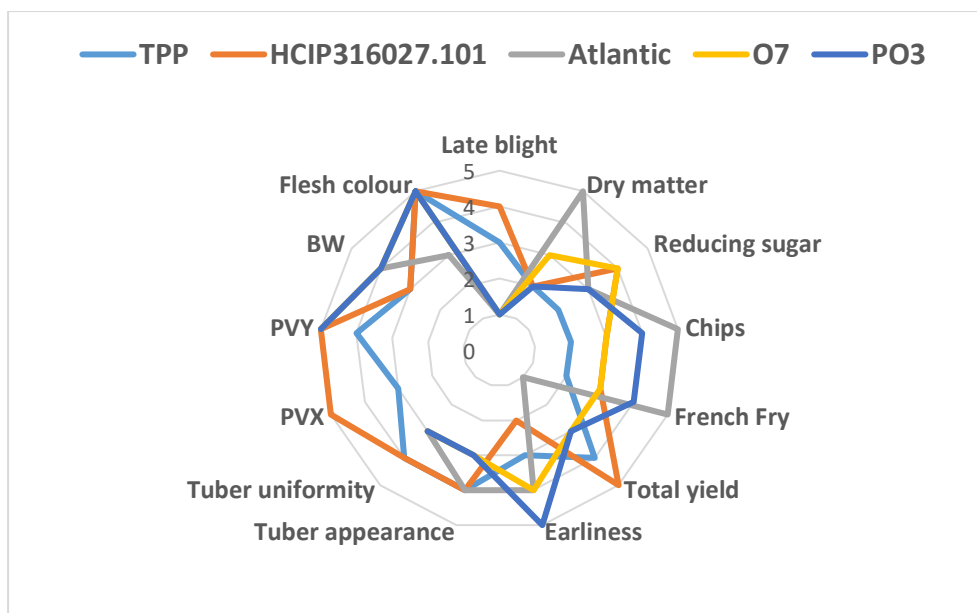


Figure 6: Graphical representation of HCIP316056.220, checks and targeted fresh product profile based on average performance in the field trials and processing traits evaluation (1= poorest, 5= best)

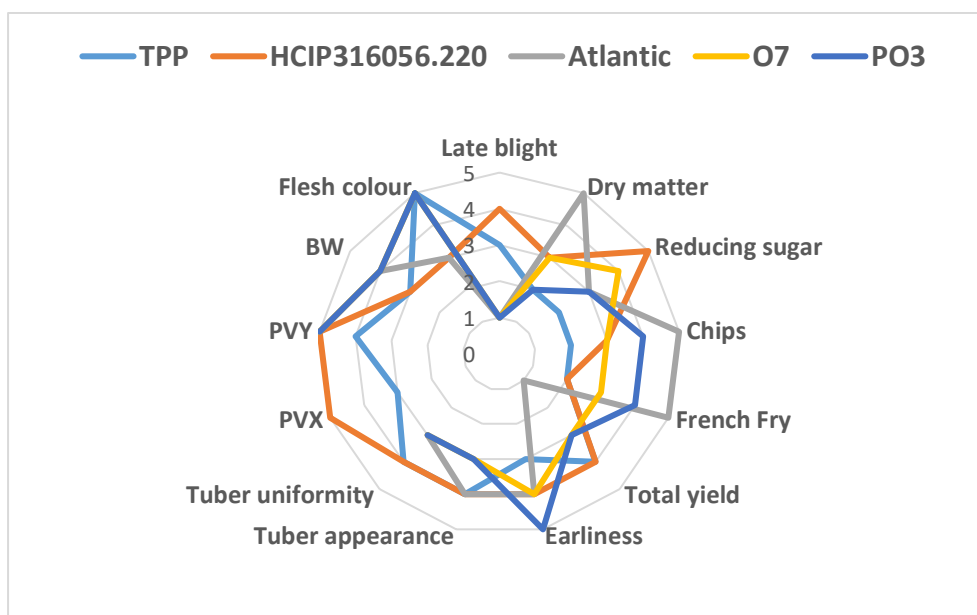


Figure 7: Product Advancement of most promising clones to Asia and Arica

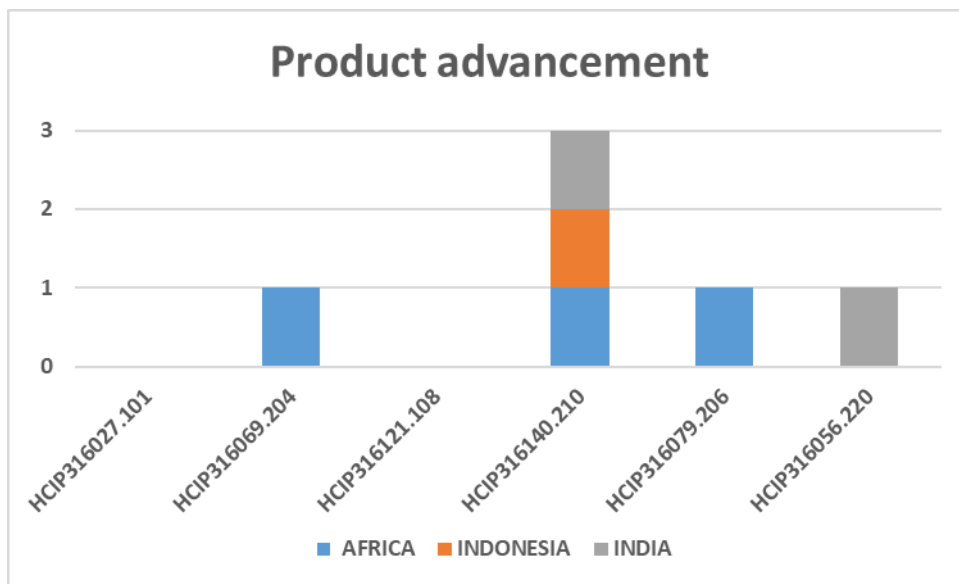


Figure 8: Frequency of selection of the 18 best families in September 2020

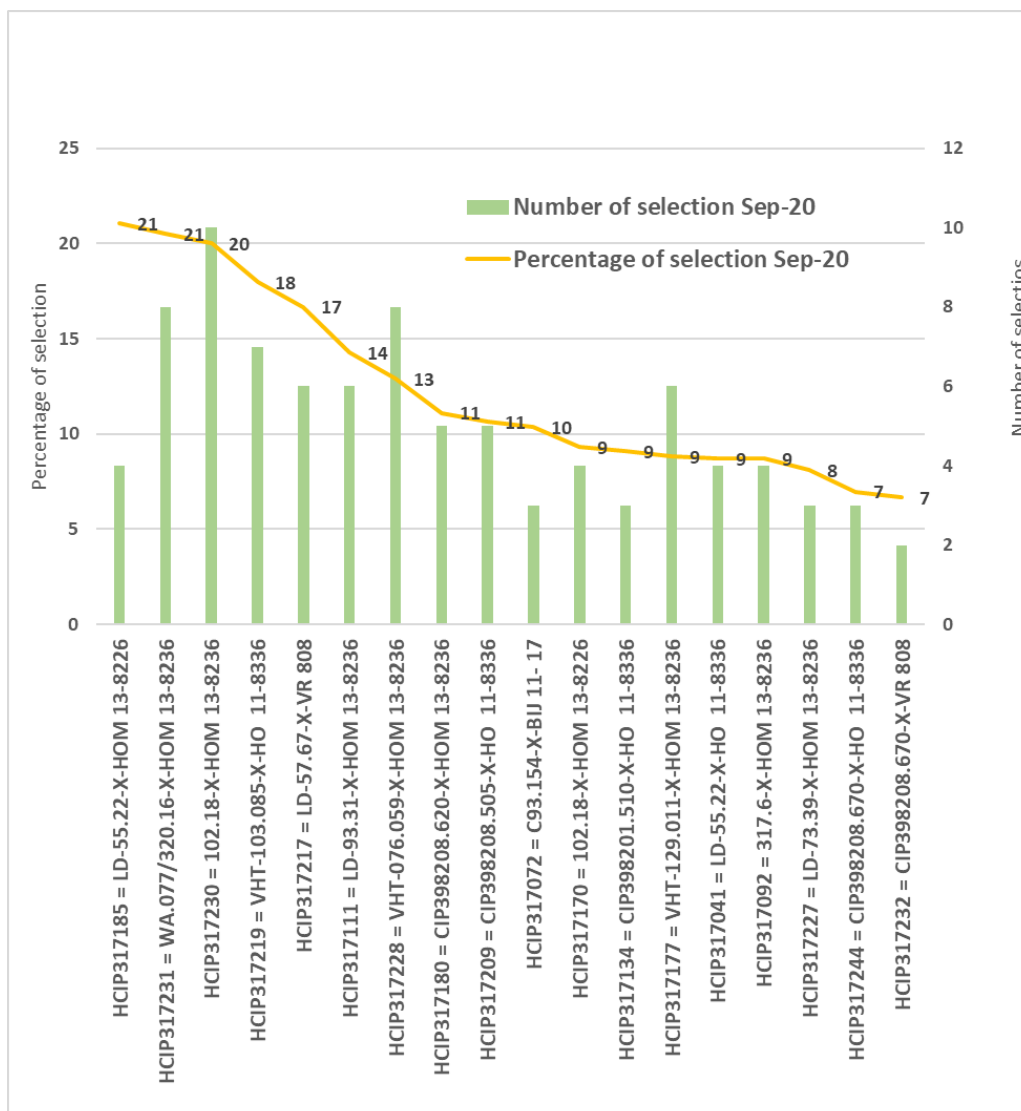


Figure 9 : Test result for bacteria testing of the advanced clones shipped to FERA

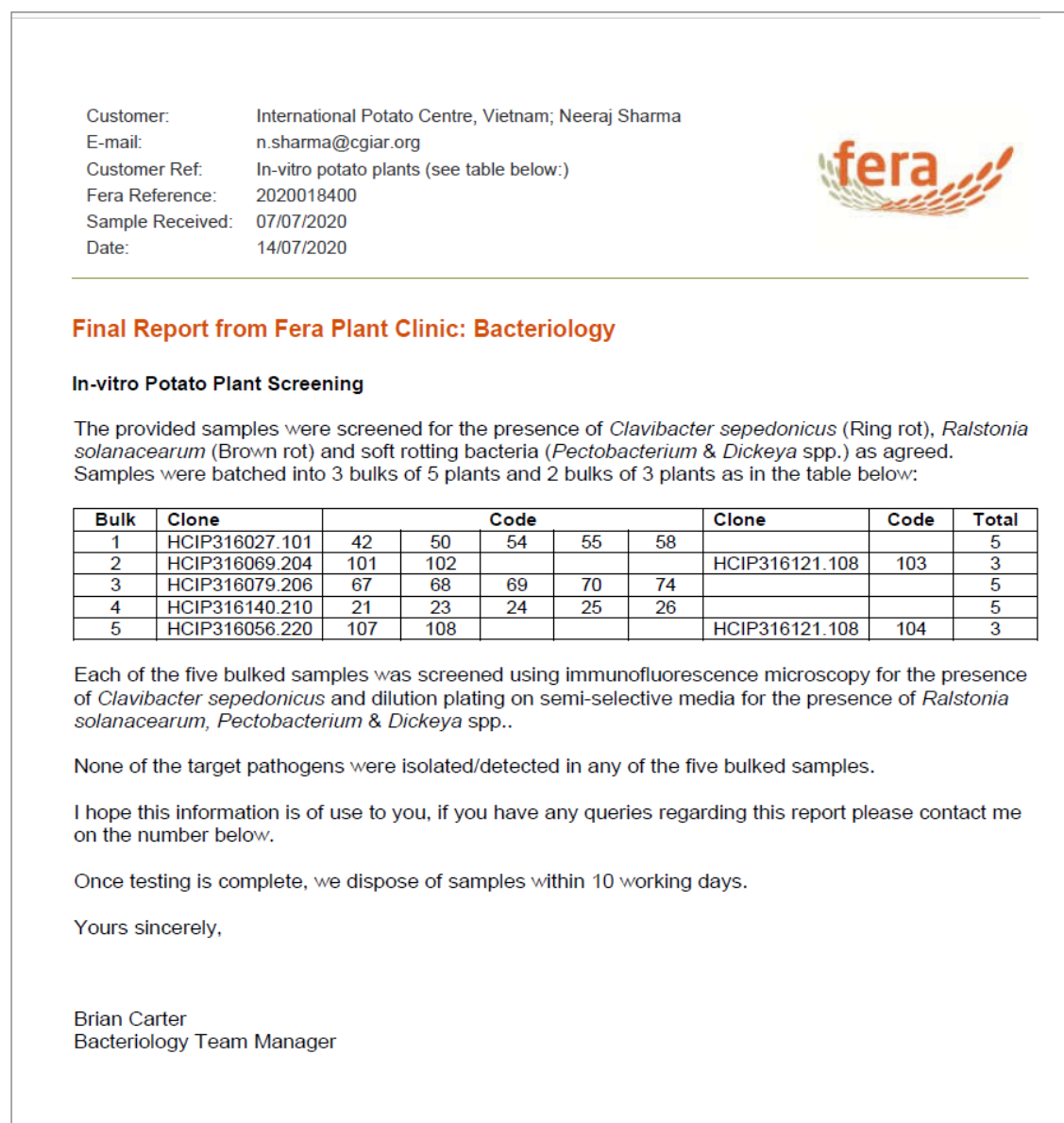


Figure 10 : Test result for virus and viroid testing of the advanced clones shipped to FERA

Page 1 of 1

Customer: Neeraj Sharma
International Potato Centre (CIP)
E-mail: n.sharma@cgiar.org
Customer Ref: Potato in - vitro plants - virology
Fera Reference: 2020018401
Sample Received: 07/07/2020
Date of Report: 06/08/2020



Final report from Fera Plant Clinic: Virology

ELISA & qPCR Results:

This is the final report from the Virology team, and this completes the work by the team.

The following teams have already completed work on you order; Bacteriology. This report completes your order.

Thank you for sending these potato samples for virus testing.

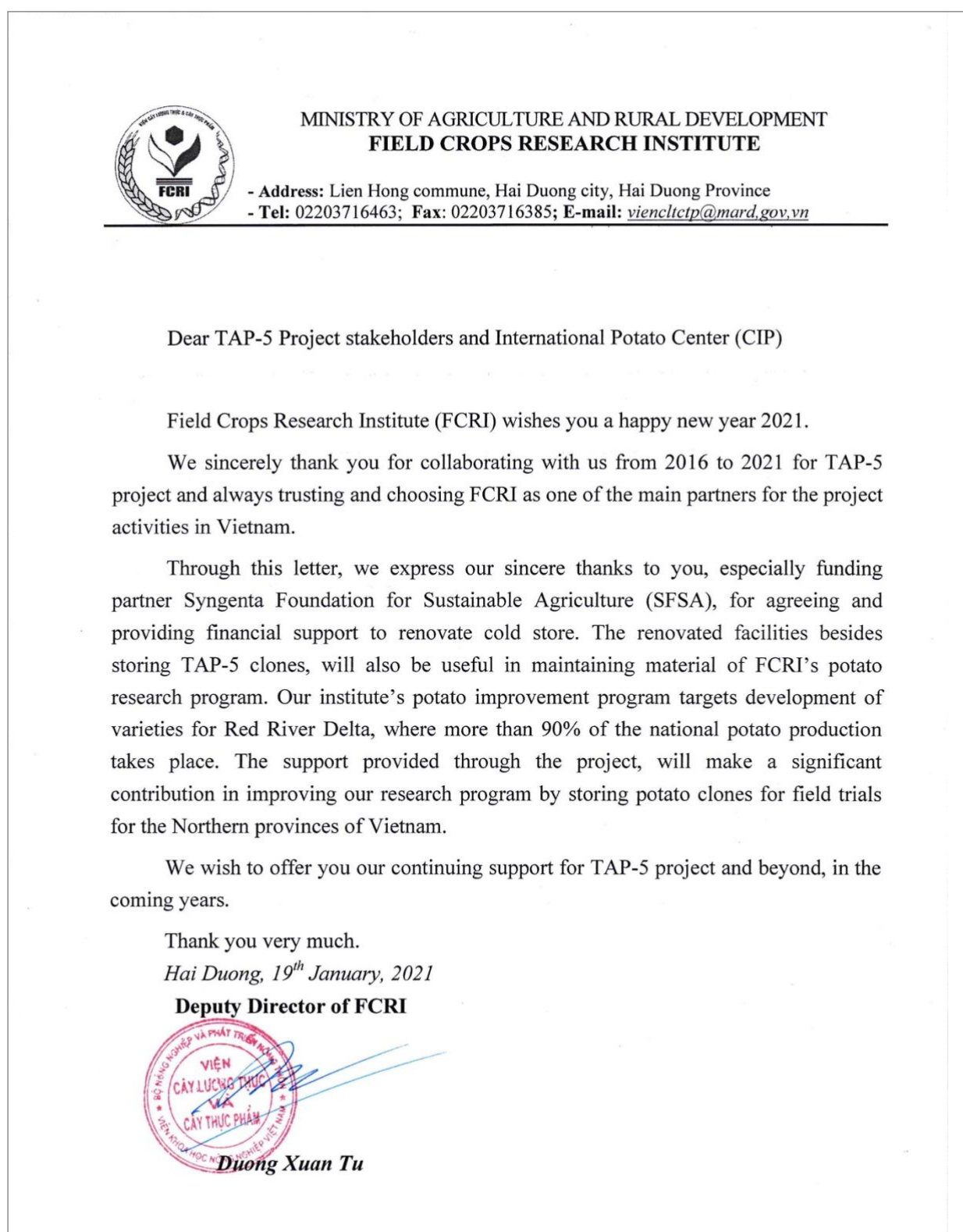
Our ref	Your ref	Result	Our comment
2020018401	Potato in - vitro plants - virology	Negative	<p>The 21 in-vitro potato samples provided were tested in bulks by TaqMan for potato spindle tuber viroid, tomato chlorotic dwarf viroid, tomato planta macho viroid, tobacco rattle virus and potato mop top virus. No viroid or virus was detected in any of the bulked samples.</p> <p>Samples were negative by ELISA for potato virus Y, potato leafroll virus, potato virus X, potato virus S and potato virus V.</p>

I hope this information is of use to you, if you have any queries regarding this report please contact me on the number below.

Once testing is complete we dispose of samples within 10 working days.

Yours sincerely,
Leanne Frew
Diagnostician

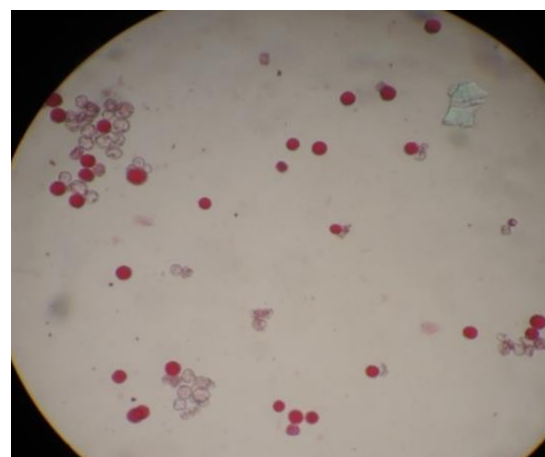
Figure 11 : Acknowledgment letter from FCRI on receiving financial support for cold-store renovation.



PHOTOS FROM FIELD WORK AND PARTNER MEETINGS



Pollen received for LBHT crossing program at CIP-Huancayo station



Pollen viability test



Crossing program for LBHT population



Berries produced from successful crosses



CIP breeders from Peru and Kenya visiting the TAP-5 trials in Red River Delta



Some selected clones in Hai Phong (February 2020)



Harvesting and selection in Hai Phong (February 2020)



Harvesting of farmer field trials in Duc Trong, Lam Dong (February 2020)



Planting field trials in Da Quy village in the Xuan Tho commune in Dalat, Lam Dong (June 2020)



Harvesting and selection in Dalat (September 2020)



Advanced clones being multiplied for shipping to HZPC (Netherlands) and FERA (UK)



Planting rooted cuttings in seed beds for minituber production of advanced clones



Established rooted cuttings after transplanting and harvested minitubers



TPS sowing and germination of newly-arrived population and seedling transplanting



Flowering in three shortlisted clones: HCIP316140.210, HCIP316069.204 and HCIP316079.206



Shortlisted clone: HCIP316069.204



Shortlisted clone: HCIP316079.206



Shortlisted clone: HCIP316140.210





Shortlisted clone: HCIP316056.220



HCIP316140.210: during field evaluation



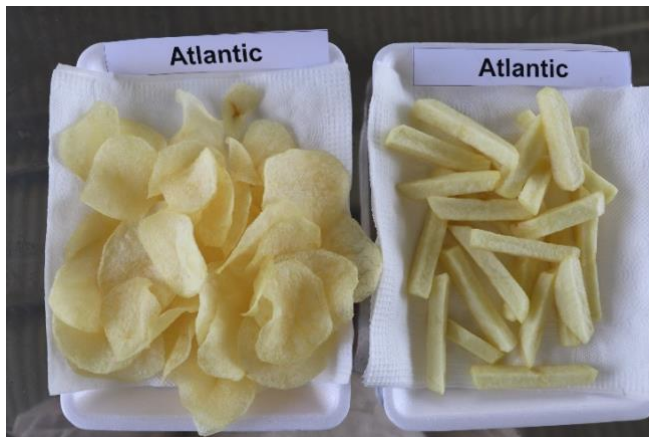
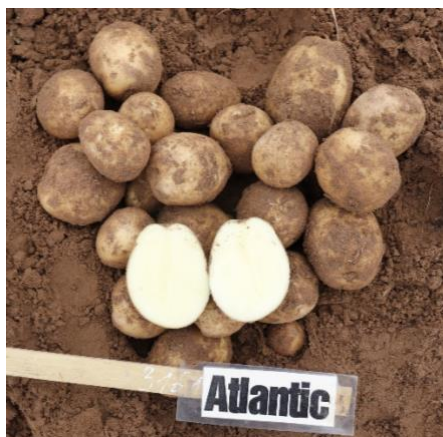
Some promising clones other than the advanced populations



Marabel and Solara: Checks in lowlands for fresh consumption



P03 and O7: Checks in highlands for fresh consumption



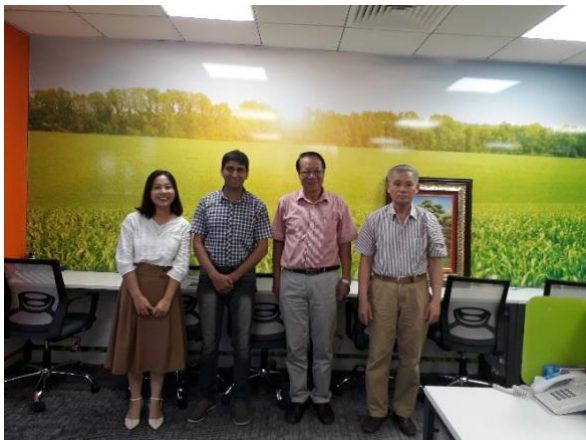
Atlantic: Check for processing sector



Evaluation of processing traits in Dalat



Processing evaluation in CIP office at Hanoi



CIP team in SFSA Hanoi office for discussion



Dr. Cuong and Dr. Dinh in the CIP office for discussion



Annual Review Meeting in Basel, Switzerland



TAP-5 team with SFSA research team in Basel

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CIP is a research-for-development organization with a focus on potato, sweetpotato and Andean roots and tubers. It delivers innovative science-based solutions to enhance access to affordable nutritious food, foster inclusive sustainable business and employment growth, and drive the climate resilience of root and tuber agri-food systems. Headquartered in Lima, Peru, CIP has a research presence in more than 20 countries in Africa, Asia and Latin America.
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