Potato Res. 18 (1975): 351–362

Neo-Tuberosum: new potato breeding material. 3. Characteristics and variability of Neo-Tuberosum, and its potential value in breeding

D. R. GLENDINNING

Scottish Plant Breeding Station, Pentlandfield, Roslin, Midlothian, EH25 9RF, Scotland

Accepted for publication: 16 October 1974

Zusammenfassung, Résumé p. 360

Summary

Observations of clones selected from the Neo-Tuberosum population show them generally to be free-flowering and very fertile. They are very variable in characters of economic importance, and offer plentiful scope for selection of parents for different breeding purposes.

The value predicted for Neo-Tuberosum depends on its possession of variation which is lacking in Tuberosum. This aspect has been little explored, but the high level of field-resistance to blight is of interest, and resistance to a race of wart to which no British varieties are immune has been detected. Comprehensive resistance to virus Y and extreme resistance to virus X have also been found. Many valuable genes may yet be found in Neo-Tuberosum.

Neo-Tuberosum × Tuberosum progenies included in our commercial breeding programme are surviving routine selection well.

Introduction

In previous papers the origin and development of the Neo-Tuberosum population (Simmonds, 1966; Glendinning, 1975a), and a general comparison of the growth and cropping of Neo-Tuberosum with both its parental Andigena population and a broadly-based Tuberosum sample (Glendinning, 1975b), have deen described. The present paper is concerned with the variability of Neo-Tuberosum. The preliminary results of an attempt to use Neo-Tuberosum in our commercial breeding programme are also reported.

Materials and methods

The observations reported below have mainly been made on clones taken from the Neo-Tuberosum population for special study. Such clones are selected annually from the seedling plots on the same criteria as are plants for inclusion in the subsequent seed-production plots, though to higher standards, thus constituting a reasonably representative though somewhat elite sample of the latter. The main selection criteria concern the shape, colour, and general desirability of the tubers, yield and maturity

receiving some but less attention because selection in the seedling year is thought to be inefficient. Characters such as specific gravity, cooking quality and disease resistance are unknown at the time of selection and in these respects newly selected clones form a fully random sample of the population; however results of tests are considered in deciding which clones to retain for future years so that retained clones constitute somewhat elite samples in these respects also.

The clones are planted in mid April, emerge in late May and are harvested in October. Each is usually in a single three-tuber plot, but much of the data presented below (Tables 1 to 7) derive from a replicated planting made in 1973. This initially contained 95 clones which had been retained from 150 selected from seedlings in 1971. Each was represented by two six-plant plots, and ten named varieties were included with six plots each. The planting was randomized and all assessments, during growth and subsequently, were recorded by plot number and thus without knowledge as to which were Neo-Tuberosum and which were named-variety samples. The planting was reduced by disease-roguing and, of those surviving to harvest, some clones represented by only few surviving plants were excluded from assessment of tuber-appearance (Table 7); others were rejected following that assessment so that fewer were included in subsequent tests (Tables 3 to 6). Data from replicate plots were averaged in preparing Tables 1 to 5 and 7, any clones having missing or doubtful entries being eliminated, hence further slight variation in the numbers of clones included in these Tables. The crisping test involved a selected sample of the clones and due to various complications (see below) individual sample scores, rather than clone averages, were used in preparing Table 6.

Tables 8 to 10 derive from two non-replicated 1972 plantings, containing different batches of clones, one of which included the same ten named varietes as the 1973 planting. Clones from both plantings were included in the blight-resistance test (Table 9) though three were missed from the 'race 4' assessment. Only clones selected for retention from one of the plantings were included in the dormancy assay (Table 8), and of these clones only such as had sufficient tubers surplus to other requirements were included in the gangrene-resistance test (Table 10).

Other data presented below derive from various plantings or samples of clones assessed at various times, and in one case (pigmentation) from a random sample of seedlings.

The named varieties included in the 1972 and 1973 plantings, and the letters identifying them in the tables, were: Pentland Crown (a), Pentland Envoy (b), Pentland Falcon (c), Pentland Javelin (d), Red Craigs Royal (e), Roslin Castle (f), Golden Wonder (g), Arran Consul (h), Majestic (i) and Record (j).

Results

Flowering, fertility, and berry and seed production

Of 94 clones observed over seven weeks (20 July to 31 August) in 1970, only two had no open flowers recorded. Most had flowers on at least five of the seven recording

dates, some having distinct peak flowering dates while others flowered more or less continuously.

Anthers were taken in August from 90 clones for assessment of pollen stainability. Most had from 40 to 80% stainable pollen, only four had under 20% and none had over 90%. Only eleven had reduced pollen quantities. Low stainabilities and reduced quantities seemed to be partly associated with virus-infected plants.

Naturally set berries were present on 81 of the clones, those lacking them having been few-flowered except one which had only 12% stainable pollen. In another planting one clone had over 100 berries per plant.

The number of seeds was counted in (usually) two berries of 78 clones; 26 had under 100 seeds per berry (minimum 15), 31 from 100 to 200, and 13 over 200 (maximum 430). A weak correlation between seed-number and pollen stainability was apparent.

Maturity

Of 70 clones in the 1973 planting which had both plots assessed, eight (11 %) seemed to be about as early as Pentland Javelin or Pentland Envoy and 26 others appeared earlier than or comparable to Pentland Crown. The remaining 36 (51 %) seemed later-maturing than is desirable in commerce, though only ten of them seemed later than Golden Wonder (Table 1).

Table 1. Maturity (1 = very early to 9 = very late).

Scores[1]	1	2	3	4	5	6	7	8	9
70 Neo-Tuberosum clones[2]:	1	2	4	5	8	13	14	12	10
10 varieties[3]:	–	1[d]	1[b]	3	3	1[a]	–	1[g]	–

[1] *Noten – Cotes*
[2] *Neo-Tuberosum Klone – clones Neo-Tuberosum*
[3] *Sorten – Variétés*

Tabelle 1. Reifezeit (1 = sehr früh bis 9 = sehr spät).
Tableau 1. Maturité (1 = très hâtif à 9 = très tardif).

Yields

Although the average Neo-Tuberosum yield was lower than that of the named varieties in 1973, most Neo-Tuberosum yields fell within the range of the latter and some outyielded all of them (Table 2).

Specific gravities

In 1973 the range of specific gravities was similar in the Neo-Tuberosum clones and in the named varieties, two of the clones equalling the exceptional specific gravity of Golden Wonder and few being of lower specific gravity than Pentland Javelin (Table 3).

Table 2. Yields per plant (kg).

	<0.5	0.5–1	1–1.5	1.5–2	2–2.5	2.5–3	3–3.5	3.5–4
71 Neo-Tuberosum clones[1]	3	6	16	29	9	4	2	2
10 varieties[2]	–	–	1[d]	4	4	1[a]	–	–

[1] *Neo-Tuberosum Klone – Clones Neo-Tuberosum*
[2] *Sorten – Variétés*

Tabelle 2. Erträge pro Pflanze (kg).
Tableau 2. Production par plante (kg).

Table 3. Specific gravity.

Specific gravity[1]	<1.07	1.07–1.08	1.08–1.09	1.09–1.10	1.10–1.11	1.11–1.12
61 Neo-Tuberosum clones[2]	4	13	19	15	8	2
10 varieties[3]	–	1[d]	5	3	–	1[g]

[1] *Spezifisches Gewicht – Poids spécifique*
[2–3] *siehe Tabelle 1 – Voir tableau 1*

Tabelle 3. Spezifisches Gewicht.
Tableau 3. Poids spécifique.

Cooking quality

About 70% of the clones from the 1973 planting fell within the range of the named varieties in degree of after-cooking blackening, some being exceptionally good. The other 30% were judged inferior, these including two which could not be scored for blackening due to excessive anthocyanin pigmentation (Table 4).

In texture of the flesh and in tendency of tubers to burst when cooked, no average differences between Neo-Tuberosum clones and named varieties were apparent. Of both groups about 43% were scored 'waxy', 39% 'intermediate' and 18% 'floury' and of both groups about 25% of the tubers burst.

Table 4. After-cooking blackening (0 = nil to 6 = severe).

Scores[1]	0	1	2	3	4	5	6	Unscored*
62 Neo-Tuberosum clones[2]	10	9	11	14	11	3	2	2
10 varieties[3]	1[d]	–	7	2[c, e]	–	–	–	–

* Unscored due to excessive anthocyanin pigmentation – *Wegen übermässiger Anthocyanin-Pigmentation nicht bewertet – Non cotations par suite d'une pigmentation excessive en anthocyane.*

[1–3] *Siehe Tabelle 1 – Voir Tableau 1*

Tabelle 4. Schwarzverfärben nach dem Kochen (0 = kein, 6 = stark).
Tableau 4. Noircissement après cuisson (0 = pas à 6 = sèvère).

Flesh colour

Most clones, in common with most of the named varieties, had white or cream flesh, but a few were a richer yellow than Record. Some had anthocyanin pigmentation in the flesh but only one had such extensive pigmentation that the underlying flesh-colour could not be determined (Table 5).

Table 5. Flesh colour (1 = white to 9 = rich yellow; also red).

Scores[1]	1	2	3	4	5	6	7	8	9	Red
62 Neo-Tuberosum clones[2]	5	14	15	12	6	2	4	1	2	1
10 varieties[3]	–	2[d, e]	3	3	1[g]	–	1[j]	–	–	–

[1–3] *Siehe Tabelle 1 – Voir Tableau 1.*

Tabelle 5. Fleischfarbe (1 = weiss bis 9 = goldgelb, auch rot).
Tableau 5. Couleur de la chair (1 = blanc à 9 = jaune intense; aussi rouge).

Crisp quality

Only samples with a high specific gravity from the 1973 planting were crisped, except that at least two samples from each named variety were tested and this sometimes required inclusion of samples with a lower specific gravity. The crisps were scored according to the standard colour-chart where possible, but some were unscoreable due to flecking or variability. These samples were sometimes of clones or varieties which obtained good scores for other samples, e.g. of Golden Wonder two samples obtained good scores and four were considered unscoreable; this made derivation of meaningful average scores difficult. Consequently, sample scores rather than clone or variety averages have been used in preparing Table 6.

Table 6. Crisp colour. Samples scored by colour chart (high scores = dark) or unscored due to faults.

Scores[1]	5	6	7	8	9	10	Unscored[4]
45 Neo-Tuberosum samples[2]*	2	10	10	5	6	4	8
39 variety samples[3]**	–	4[a,g,g,j]	5[dh3j]	8	13	4	5[d,4g]

* 25 clones with one or two samples each – *25 Klone mit je einem oder zwei Mustern – 25 clones avec un ou deux échantillons chacun.*
** Consisting of – *Bestehend aus – Composants de* 4a, 2b, 5c, 2d, 2e, 6f, 6g, 3h, 3i and 6j.

[1] *Noten – Cotes;* [2] *Neo-Tuberosum-Muster – Echantillons Neo-Tuberosum;* [3] *Sortenmuster – Echantillons de variétés;* [4] *Nicht beurteilt – Non cotés.*

Tabelle 6. Chipsfarbe Muster nach der Farbkarte beurteilt (hohe Werte = dunkel) oder wegen Fehlern nicht beurteilt.
Tableau 6. Couleur des chips. Echantillons cotés d'après carte de couleurs (cotes élevées = foncé) ou non cotés en raison de défauts.

The scores allocated in this test were rather high, i.e. the crisps were judged to be rather dark relative to normal experience; the reason is not known. However the Neo-Tuberosum samples on average appeared superior to the named-variety samples. Some appeared superior to the standard crisping variety Record which had an average score of 7 (range 6 to 8). Tests conducted in 1972, including the same named varieties but lacking replication, gave generally lower scores mostly in the range 4 to 6, and also indicated that Neo-Tuberosum potatoes tend often to be good crispers relative to Tuberosum.

Tuber appearance

The tubers from the 1973 planting were assessed for appearance. The assessment gave an overall evaluation based on shape, size, smoothness and uniformity, while also taking account of skin colour and texture and the presence of excessive scab, premature sprouting or other faults. The best of the named varieties proved superior to any of the Neo-Tuberosum clones, but several clones proved superior to Roslin Castle and Arran Consul and only one was judged worse than Golden Wonder (Table 7).

Table 7. Tuber appearance (1 = best, 9 = worst).

Scores[1]	1	2	3	4	5	6	7	8	9
66 Neo-Tuberosum clones[2]	–	–	3	5	19	17	13	8	1
10 varieties[3]	1[c]	2[d,e]	4	–	2[f,h]	–	–	1[g]	–

[1–3] *Siehe Tabelle 1 – Voir Tableau 1.*

Tabelle 7. Aussehen der Knollen (1 = am besten, 9 = am schlechtesten).
Tableau 7. Aspect du tubercule (1 = le meilleur, 9 = mauvais).

Dormancy

Samples from the 1972 planting were scored for sprouting in April 1973 having been kept over winter in a rather warm store. Most Neo-Tuberosum clones fell within the range exhibited by the varieties, though a few were less dormant than any of them while only one matched the deep dormancy of Arran Consul (Table 8).

Pigmentation

A random sample of 300 seedlings were scored for skin and eye colours. Results were as follows: 56% unpigmented, 14% with eyes pigmented, 20% with eyes and skin similarly pigmented, 6% with the eyes darker than the skin, and 4% with the skin pigmented or part-pigmented and the eyes, or some of the, white, The 44% with pigment present consisted of 16% with purple pigment, ranging from light to dark, and 28% with pink or red pigment only.

Clones with unpigmented tubers frequently have pigment in the stems or flowers, and only about 10% of clones appear pigment-free. White flowers sometimes occur in

Table 8. Dormancy; length of the longest sprout (cm) on each 4-tuber sample, April 1973.

Lengths[1]	< 4	4–10	11–20	21–30	> 30
135 Neo-Tuberosum clones[2]	1	42	53	26	13
10 varieties, two samples each[3]	2[h,h]	3	12	3	–

[1] *Länge – Longueurs*
[2] *Neo-Tuberosum-Klone – Clones Neo-Tuberosum*
[3] *Sorten, je 2 Muster – Variétés, deux échantillons de chacune*

Tabelle 8. Keimruhe; Länge des längsten Keims (cm) in jedem Muster zu 4 Knollen, April 1973.
Tableau 8. Dormance; longueur du plus long germe (cm) de chaque échantillon de 4 tubercules, Avril 1973.

conjunction with pigmented tubers. Flower colours include a wide range of pinks, purples, and blues.

Blight resistance

Simmonds & Malcolmson (1967) have reported on the development of field-resistance to blight in the Neo-Tuberosum population. Table 9 summarizes the results of a typical detached-leaflet test such as they described, conducted in 1972 and involving two blight races. With both races the great majority of the Neo-Tuberosum clones appear more resistant than most of the named varieties. Neo-Tuberosum clones generally appear more resistant to a 'race 4' isolate of blight than to a 'complex' isolate, while named varieties unless protected by *R*-genes (e.g. Roslin Castle and Pentland Falcon) appear equally susceptible to both races; this apparently strain-specific response requires further investigation.

Table 9. Blight resistance; Detached-leaflet test, lesion-size scores (low scores indicate resistance).

Scores[1]	0 to 1+	2− to 3−	3 to 4	4+ to 5
(a) 'Complex' race[4]				
276 Neo-Tuberosum clones[2]	–	5	223	48
10 varieties	–	–	3[d,g,j]	7
(b) 'Race 4'				
273 Neo-Tuberosum clones	38	105	113	17
10 varieties	1[f]	1[e]	2	6

[1–3] *Siehe Tabelle 1 – Voir tableau 1*
[4] *'Komplexe' Rasse – Complexe de races*

Tabelle 9. Krautfäuleresistenz; Einzelblatt-Test, Werte für die Grösse der Läsionen (niedrige Werte bedeuten Resistenz).
Tableau 9. Résistance au mildiou; test sur foliole détachée, cotes de l'importance des lésions (les cotes basses indiquent de la résistance).

Some clones have been found to be field-resistant when tested in the Toluca Valley in Mexico (by courtesy of the Rockefeller Foundation) and promising levels of resistance to a 'complex' race have been found in detached-leaflet tests of some Neo-Tuberosum × Tuberosum progenies.

Virus resistance

Tests have shown about half the clones to be resistant to virus X, most having strain-specific and a few comprehensive resistance.

Preliminary tests suggest that about one-third of the clones are resistant to virus Y, about half of these having strain-specific and half comprehensive resistance. Resistance to leaf roll has not been investigated.

Wart resistance

Only preliminary wart-resistance tests have been undertaken, involving a few tubers of a clone, and such tests do not reveal all the susceptibles. The proportion of immune clones is thus uncertain; tests in 1973 and earlier suggested that 75% or more were immune but some recently received data (August 1974), perhaps from more severe tests, show 22 of 46 clones to be non-immune and suggest that a still higher proportion may be so. However most of the non-immune clones show some resistance, and resistance to a race of wart to which all British 'immune' varieties are susceptible has been found in Neo-Tuberosum material grown in Newfoundland (Proudfoot, personal communication).

Gangrene resistance

A test over the 1972–73 winter showed the same range, from very resistant to very susceptible, in Neo-Tuberosum clones as in the ten named varieties which had been grown with them (Table 10). Only one Neo-Tuberosum clone was classed as very resistant while three varieties appeared so in this test, but several Neo-Tuberosum clones were placed in the resistant category.

Table 10. Gangrene resistance.

Assessments[1]	Very resistant[2]	Resistant[3]	Intermediate[4]	Susceptible[5]	Very susceptible[6]
57 Neo-Tuberosum clones	1	14	25	14	3
10 varieties	3[e,h,j]	1	3	2	1[b]

[1] *Beurteilungen – Evaluation;* [2] *Sehr resistent – Très résistant;* [3] *Resistent – Résistant;* [4] *Mittel – Intermédiaire;* [5] *Empfänglich – Susceptible;* [6] *Sehr empfänglich – Très susceptible.*

Tabelle 10. Phoma-Resistenz.
Tableau 10. Résistance à la gangrène.

Utilisation of Neo-Tuberosum in breeding

In 1969, seven Neo-Tuberosum clones were crossed with Tuberosum breeding lines and commercial varieties. The resultant seedlings constituted 45% of the 34000 raised in one section of our breeding programme in 1970. Selection in the greenhouse and subsequently in the field reduced numbers to 742 planted in 1973, of which 36% were derived from Neo-Tuberosum. The 742 included 29 chosen to receive special attention ('promoted') of which 13 were derived from Neo-Tuberosum, and involved five of the seven Neo-Tuberosum parents. Of the 357 retained for planting in 1974, 26% are derived from Neo-Tuberosum. Selection thus-far has been based on maturity, yield and the presentability of the tubers; tests for disease resistance and cooking and processing qualities are to follow.

While the representation of Neo-Tuberosum derived material is declining, it remains substantial and the possibility exists that one or more commercial varieties may emerge from this first serious breeding attempt to utilise Neo-Tuberosum. It appears that Neo-Tuberosum parents may prove valuable in the breeding programme, and in this connection it should be noted that there is evidence of hybrid vigour in crosses between Andigena or Neo-Tuberosum and Tuberosum (Howard, 1963a, b; Anon., 1966; Glendinning, 1969; Plaisted, 1972; Plaisted & Cubillos, 1973; Tarn & Tai, 1973).

Discussion

In a previous paper (Glendinning, 1975a) it was suggested that the general resemblance between Neo-Tuberosum and Tuberosum would facilitate use of Neo-Tuberosum in breeding. The data presented above shows the great variability of Neo-Tuberosum, and indicate that it offers plentiful scope for selection of parents for different breeding purposes. The ready flowering and high fertility of Neo-Tuberosum makes crossing with Tuberosum easy.

While the similarity of Neo-Tuberosum to Tuberosum will facilitate its use in breeding, the true value of Neo-Tuberosum will derive from its possession of variability which is lacking in Tuberosum. This aspect has been little explored. Evidence of yield heterosis, presumably deriving from differences in the genetic backgrounds of the two populations, has been mentioned. Comprehensive resistances to viruses X and Y, though present in some modern varieties or breeding lines having Andigena or wild species in their ancestry, were seemingly absent from Tuberosum previously and their presence in Neo-Tuberosum serves to emphasize that other valuable genes may be present, as yet undetected. The wart resistance detected by Proudfoot may prove of practical interest, as may the high level of field resistance to blight which has been developed.

Breeders seeking variation outside the range available in Tuberosum may well find it worth exploring the potential of Neo-Tuberosum before turning to unselected Andigena or to wild species.

Acknowledgments

The experimental programme in which Neo-Tuberosum was developed was conceived and initiated by my Director, Dr N. W. Simmonds, who from 1967 entrusted its management to me. I am indebted to colleagues for assessments of disease resistance and cooking qualities and for acceptance of Neo-Tuberosum clones as parents in our commercial breeding programme.

Zusammenfassung

Neo-Tuberosum: Neues Kartoffelzüchtungsmaterial. 3. Eigenschaften und Variabilität von Neo-Tuberosum und sein potentieller Wert in der Züchtung

Es werden Daten dargelegt, um den grossen Variationsbereich von Neo-Tuberosum aufzuzeigen. Die meisten Klone blühen reichlich und sind sehr fruchtbar. Obwohl viele spätreif sind, gibt es auch andere, die eine mittlere Reifezeit haben, und einige sind frühreif (Tabelle 1). Einige sind sehr ertragreich (Tabelle 2). Das Spezifische Gewicht schwankt stark (Tabelle 3), und manche sind von annehmbarer Kochqualität (Tabelle 4). Die meisten haben weisses oder crêmefarbenes Fleisch, aber einige sind sattgelb oder rot (Tabelle 5). Manche ergeben ausgezeichnete Chips (Tabelle 6). Obwohl keine Sorte so ausgezeichnete Knollenformen aufwies wie die besten der genannten Sorten, mit denen sie verglichen wurden, waren doch einige mit andern erwähnten Sorten vergleichbar (Tabelle 7). Die meisten zeigten eine Knollenkeimruhe im gleichen Ausmass wie die genannten Sorten, obwohl einige weniger Keimruhe aufwiesen als irgendeine von ihnen (Tabelle 8). Eine breite Skala von Variationen in der Pigmentierung wird beschrieben.

Die meisten Klone haben eine bessere Feldresistenz gegenüber einer komplexen Rasse von Krautfäule als die genannten Sorten (Tabelle 9a) und haben eine höhere Resistenz gegenüber einem 'Rasse 4'-Isolat als gegenüber der 'komplexen' Rasse (Tabelle 9b). Man hat rassenspezifisches und umfassendes Resistenzverhalten sowohl gegen Virus X als auch gegen Virus Y festgestellt. Manche scheinen immun, und einige andere sind gegen die britische Krebsrasse resistent. Auch wurde Resistenz gegenüber einer andern Krebsrasse entdeckt. Die Phoma-Resistenz ist stark schwankend (Tabelle 10).

Sieben Neo-Tuberosum-Klone wurden 1969 mit Tuberosum-Züchtungslinien gekreuzt. Diese Kreuzungen machten 45% der teilweise in unserem Züchtungsprogramm 1970 angezogenen 34000 Sämlinge aus und 26% der 357 Klone, die wir davon zurückbehielten, um sie 1974 auszupflanzen. Ausserdem konnte aus diesem ersten Versuch, Neo-Tuberosum in der Züchtung zu verwenden, schon eine Handelssorte hervorgehen.

Während die allgemeine Aehnlichkeit von Neo-Tuberosum mit Tuberosum den Gebrauch in der Züchtung erleichert, liegt ihr Wert in ihren Unterschieden zu Tuberosum. Dieser Aspekt wurde wenig erforscht, aber die Entdeckung umfassender Resistenz gegenüber den Viren X und Y, Resistenz gegenüber einer Krebsrasse, für die alle britischen 'immunen' Rassen empfänglich sind, und die Entdeckung eines hohen Grades an Feldresistenz gegenüber Krautfäule sind von Interesse, und es gibt Anzeichen von Ertrags-Heterosis in Kreuzungen von Neo-Tuberosum × Tuberosum. Züchter, die genetische Variationen ausserhalb des Tuberosum-Bereichs erforschen, dürften die Untersuchung von Neo-Tuberosum lohnend finden.

Résumé

Neo-tuberosum: nouveau matériel d'amélioration de la pomme de terre. 3. Caractéristiques et variabilité de Neo-tuberosum et sa valeur potentielle dans l'amélioration

L'auteur apporte les présentes données pour montrer le haut degré de variation dans Neo-Tuberosum. La plupart des clones fleurissent librement et sont très fertiles; quoique beaucoup sont de maturité tardive, d'autres sont de récolte principale et quelques-uns sont précoces (tableau 1.). Quelques-uns sont très productifs (tableau 2). Le poids spécifique varie largement (tableau 3) et beaucoup présentent une qualité culinaire acceptable (tableau 4). La plupart ont une chair blanche ou crêmeuse mais quelques-uns sont d'un jaune intense ou rouge (tableau 5). Beaucoup donnent d'excellentes chips (tableau 6). Bien qu'aucun ne donne des tubercules de forme aussi bonne que les meilleures des variétés dénommées avec lesquelles ils sont comparés, plusieurs sont comparables avec d'autres variétés dénommées (tableau 7). La plupart montrent des dormances du tubercule du niveau des variétés dénommées, quoique quelques-uns soient moins dormants qu'aucun de celles-ci (tableau 8). On observe une large variation de pigmentation.

La plupart sont plus résistants au champ à un complexe de races du mildiou que les variétés dénommées (tableau 9a), et sont plus résistants à la race 4 qu'ils ne le sont au complexe des races (tableau 9b). On a détecté un strain spécifique et des résistances étendues aux deux virus X et Y. Beaucoup apparaissent immuns et beaucoup d'autres résistants à la race britannique de galle noire, et la résistance à une autre race de galle noire a été détectée. La résistance à la gangrène est largement répandue (tableau 10).

Sept clones Neo-Tuberosum furent croisés en 1969 avec des lignées d'amélioration de Tuberosum. Ces croisements donnèrent 45% des 34000 plantules produites dans une partie de notre programme d'amélioration en 1970, et 26% des 357 clones de ceux-ci furent retenus pour la plantation en 1974. Une variété commerciale pourrait déjà sortir de ce premier essai d'utilisation de Neo-Tuberosum dans l'amélioration.

Alors qu'une ressemblance générale de Neo-Tuberosum avec le Tuberosum faciliterait son utilisation dans l'amélioration, sa valeur résidera dans ses différences avec Tuberosum. Cet aspect a été peu exploré, mais la détection d'une résistance étendue aux virus X et Y, d'une résistance à une race de galle noire à laquelle toutes les variétés britanniques sont susceptibles, et de hauts degrés de résistance au champ au mildiou sont intéressants, et il y a des preuves d'hétérosis de productivité dans les croisements Neo-Tuberosum × Tuberosum. Les améliorateurs cherchant la variation génétique en dehors du champ disponible dans le Tuberosum peuvent faire une recherche valable dans le Neo-Tuberosum.

References

Anonymous, 1966. Rep. John Innes hort. Inst. 1965: 51–53.

Glendinning, D. R., 1969. The performance of progenies obtained by crossing Groups Andigena and Tuberosum of *Solanum tuberosum*. *Eur. Potato J.* 12: 13–19.

Glendinning, D. R., 1975a. Neo-Tuberosum: new potato breeding material. 1. The origin, composition, and development of the Tuberosum and Neo-Tuberosum gene-pools. *Potato Res.* 18: 256–261.

Glendinning, D. R., 1975b. Neo-Tuberosum: new potato breeding material. 2. A comparison of Neo-Tuberosum with unselected Andigena and with Tuberosum. *Potato Res.* 18: 343–350.

Howard, H. W., 1963a. Breeding possibilities using *Andigena*. *Rep. Pl. Breed. Inst.* 1961/62: 20.

Howard, H. W., 1963b. The significance of breeding in improving quality and yield. In: The growth of the potato. Butterworths, London, pp. 292–302.

Plaisted, R. L., 1972. Utilisation of germ-plasm in breeding programmes; Use of cultivated tetraploids. In: Prospects for the potato in the developing world. Centro Internacional de la Papa, Lima, Peru, pp. 90–99.

Simmonds, N.W., 1966. Studies of the tetraploid potatoes. III. Progress in the experimental re-creation of the Tuberosum Group. *J. Linn. Soc. (Bot.)* 59: 279–288.

Simmonds, N. W. & J. F. Malcolmson, 1967. Resistance to late blight in *Andigena* potatoes. *Eur. Potato J.* 10: 161–166.

Plaisted, R. L. & A.G. Cubillos, 1973. Components of yield in potato crosses involving andigena and tuberosum germplasms. *Am. Potato J.* 50: 336.

Tarn, T. R. & G. C. C. Tai, 1973. Heterosis in F1 hybrids between group Andigena and group Tuberosum potatoes. *Am. Potato J.* 50: 337.