merit. The Society, through its president, will invite specific individuals, usually from outside the limits of North America, to write feature articles on cultivar development, fruit breeding, rootstocks and cultural programs.

4) The strength of any society is based on its membership and member contribution. It is important that all members keep their membership current and that they also encourage others to join APS. A vigorous effort will be made to establish a stronger membership base. I would encourage all to participate in this endeavor in 1983.

Four areas of APS activity have been outlined. Achieving them is a membership opportunity if not a responsibility. To this end, I encourage the submission of suggestions and comments on how APS can meet your interest through the *Fruit Varieties Journal* and the other ancillary services that are a regular and continuing society function.

The following three reports were presented as part of the American Pomological Society Workshop

"Rootstocks: Present and Future"

August 10, 1982

IOWA STATE UNIVERSITY, AMES, IOWA

The Peach Rootstock Situation: An International Perspective

ROY C. ROM[1]

The report was developed to inform the reader of the current peach rootstock situation both at the production level and at the research frontier. It is based on an international survey in which forty researchers from twenty-five peach producing countries supplied me with information. These contributors are listed, by country, at the end of this report. While not all countries responded to the questionnaire submitted (i.e. Portugal and China), some were not contacted due to lack of suitable contact (i.e. Russia and Turkey), the information collected and summarized here, I feel, accurately indicates the current state of the art by defining what rootstocks are being used.

A starting point is to review what is anticipated in a rootstock for peach. This serves as a point for comparison when rootstock problems are discussed and also indicates the degree of compromise that exists in the rootstocks now used and the challenge for their improvement.

Primary is the requirement for stock scion compatibility. As one moves out of the *Prunus persica* gene pool into other *Prunus* species or into the use of interspecific hybrids, compatibility becomes attenuated, subject to stress,

[1]University of Arkansas, with approval of the director, Arkansas Agricultural Experiment Station.

and failure. This limitation is experienced world wide.

Aside from compatibility, rootstock requirements or attributes can be regulated to two broad categories, i.e. the production of trees (nursery characteristics) and the production by trees (orchard characteristics). The former are frequently overlooked, but relate to such factors as: high propagation percentage by seed (germination) or asexual means (rootability); straight plant growth; vigor; freedom from debilitating nursery diseases; ease of bud insertion; proper healing; and an extended budding season. For orchard production, other attributes become paramount. Homogeneity of orchard stand, regardless of vigor control desired, is a rootstock effect. Production from the orchard is related directly to the selected rootstocks' adaptability to the edaphic and climatic environment. It is precisely in the area of nursery characteristics or orchard adaptability that the rootstock problems of the world not only exist but are tolerated.

ROOTSTOCK PROBLEMS

There is no question that in peach production areas there are an array of rootstock problems relating to a microclimate, macro-climate, soil genesis, or ecological pest factors. Sometimes the limitations come down to a specific orchard site. Thus, priority of problems is and remains a regional, or local characteristic. The survey revealed the nature of these problems and showed that many of them are common in a substantial number of peach production areas (Table 1). First, let us examine those problems associated with tree production. Lack of good propagation character is a problem in 44% of the countries and related to such items as poor seed germination, inadequate clonal rooting techniques, low availability of desired seed source or clonal stock, variability in growth and the problem of virus indexing. Compatibility problems occur in 24% of the countries where local seedlings or diverse *Prunus* species are traditionally used as stocks. Although primarily a nursery problem, in some instances it occurs as delayed incompatibility after 5-10 years (Mexico, Italy, Romania, India, Greece and Argentina).

Dominant among rootstock problems were those associated with the orchard environment.

Nematode attrition, through attack or infestation of peach tree root systems, is estimated to reduce production by 15%. Root systems are subject to four types of nematode problems (Table 2). They prevent homogenous orchard establishment and reduce tree life. Sources of rootknot nematode (Melodogne, 3 species) resistance are found in Shalil, S-37, Nemaguard, Okinawa, *P. armeniaca, davidiana,* and *mume*; for Lesion nematode (Pratylenchus, 3 species) in Y 322, 327 and 461 from Russia, H 661203, U.S. and Yeh Hsiemtuny Tao from China. Nematode problems and concerns were reported from 68% of the countries.

The importance of producing nematode-free stocks was stressed as an important issue since learning that they serve as vectors or predispose root systems to diseases.

Water-logging is a significant problem common to the countries surveyed. While the problem is widespread, the cause varies from excess seasonal rainfall to poorly drained soils or a combination of both. With respect to sensitivity of *Prunus* species to water-logging, the almond, peach and apricot are about equal and more sensitive than the cherry which is more sensitive than the plums. Thus, water logging resistance and adaptability to heavy soils is gained through the use of plum rootstocks or interspecific hybrids between peach and plums. Drought resistance is sought by using peach-almond hybrids and possibly from *P. amygadlus.*

Table 1. Peach Rootstock Problems Related to Nursery and Orchard Production as Reported in the Survey.

	Problem												
Country	Nematodes	Water Logging	Drought	Soil Diseases	Alkalinity	Nutrition	Vigor Control	Hardiness	Soil Insects	Longevity	Productivity	Propagation	Compatibility
Argentina	X	X	X		X	X	X	X		X	X	X	X
Australia	X			X	X		X				X	X	
(Tasmania)		X					X						
Brazil	X												
Canada	X			X				X		X		X	
Chile	X	X				X							
Czechoslovakia					X	X		X			X	X	
France		X		X									
Greece	X	X		X	X	X						X	X
Hungary					X					X			
India	X	X		X						X		X	X
Israel	X						X						
Italy	X	X		X	X	X	X			X	X	X	X
Japan	X					X	X					X	
Korea		X		X				X		X			
New Zealand	X	X		X					X	X			
Mexico	X	X	X	X	X	X					X	X	X
Romania		X		X	X			X	X			X	X
South Africa	X	X					X						
Spain	X	X			X								
Taiwan				X									
United States	X	X	X	X				X	X	X			
Uruguay		X		X						X			
Yugoslavia	X	X			X	X				X		X	
Zimbabwe	X			X		X		X					
% of all countries	68	64	12	56	44	36	28	28	12	40	20	44	24

Table 2. Peach Rootstock Nematode and Soil Disease Concerns.

Nematodes	Diseases	
A. *Rootknot* Melodogne — 3 species	A. *Viral*	
B. *Lesion* Pratylenchus — 7 species	B. *Bacterial* Pseudomonas Agrobacterium	
C. *Ring* Criconemoides — 6 species	C. *Fungal* *Root Rots* Phytophthora Clitocybe Armillaria	*Other* Phythium Fusarium Fusiccocum Rhizocionia Stereum Verticilium
D. *Dagger* Xiphinema — 3 species		

Rootstock diseases are an evidential problem in 56% of the countries. The necessity of virus free stock and tree production is stressed in France and Australia, given less if any concern in other areas. Resistance to the listed bacterial and fungal root rots (Table 2) is a rootstock requirement. Genes for this need are found in the *Prunus* species, unfortunately not to a significant degree in *P. persica*. The minor fungal diseases usually occur in nursery production and are handled by cultural procedures, rotation, fumigation, and spray programs.

Alkalinity is a problem in 44% of the countries where soil calcium levels may reach or exceed 12%. The induced leaf chlorosis resulting from use of non adapted rootstocks is debilitating to production and fruit quality. Considerable progress has been made in selection and breeding for alkaline soil adaptation through peach almond hybrids, and use of *P. insititia* resources. The United States was the only country considering soil acidity to be a concern and one not necessarily answered by rootstock improvement.

While 36% of the countries reported rootstock nutrition as a problem, only Israel was specific in citing minor element nutrition problems when Nemaguard was used as a stock. Rootstock soil nutrient interaction is a neglected area that needs more research.

Vigor management, a concern in 28% of the countries, requires some discussion. Where increased or maintained tree vigor is desired, i.e. on replant sites or low fertility soils, the plum stocks GF 43 or Brompton are in common usage (Table 3). Nemaguard trees are vigorous especially on nematode free soils as are peach-almond hybrid GF 677 stocks on fertile soils. Where moderate to semi dwarfing rootstocks are desired black damas, damas 1869, common Mussel and *P. insititia* selections and clones are used. Italy has several wild peach selections. One is reported to reduce scion tree size by 30% (Pisa #2). This moderate tree size range seems to meet the size requirement for higher density plantings, particularly in Australia.

Use of dwarfing stocks at present has apparently little commercial appeal. Several Prunus species will dwarf peach scions, usually with accompanying problems of a nursery and orchard character. The Diker clone of *P. tomentosa* is more consistent as a rootstock than seedlings of *P. tomentosa* or *P. besseyi*. Extreme dwarfing may be better obtained by the development of genetically dwarfed cultivars.

Hardiness, both in terms of extreme winter cold and in areas with pre or post winter fluctuating temperature extremes, was an expressed problem

Table 3. Peach Scion Vigor Management Through Rootstock Selection.

A. Increased or maintained vigor		
Nemaguard	Brompton	
GE 43 (Plum)	GF 677 (Peach x Almond)	
B. Moderate to Semi Dwarfing size control		
Black Damas (Plum)		St. Julien A_1 x
Damas 1869 (Natural Plum Hybrid)		GF 655.2 (St. Julien)
Common Mussel Plum		GF Hybrid #1 and 2 (St. Julien)
Pisa #2 (Peach Selection)		
C. Dwarfing		
P. tomentosa	*P. besseyi*	
Diker clone		

in Canada, Argentina, Czechoslovakia, Korea, Romania and the U.S. Sources of resistance can be found in *P. persica* and several other P. species.

Peach tree longevity and productiveness were reported consistently as a rootstock problem; however, the cause of short life or low production is more specifically found in the rootstock problems already presented and may be the summation of several rootstock problems as well as cultural practice abuse.

The information presented to this point contrasts rootstock attributes with problems. A summation of current commercial rootstock utilization demonstrates the compromise that exists between what is desired in a peach rootstock and what is actually used.

CURRENT ROOTSTOCK UTILIZATION

Table 4 gives a general outline of the sources utilized for peach root systems. Peach seedlings remain as the dominant rootstock source in the world today. They can be classified by source: wild types, commercial cultivars or rootstock selections. This listing is in order of importance in common usage.

Since the introduction of *P. persica* into regions of the world from its origin in China, there have been numerous escapes into the wild resulting in exposure to natural selection processes. These naturalized peaches serve as a seed source for propagators. Some countries list them as simply *P. persica* or *P. sylvestris*. Generic terms may be applied, for example: Cuaresmillo, Argentina; Creole, Mexico; Yugoslavian Wilds, France; Frank or Franco, Spain and Italy; Missouri in Tunisia and Morocco and vineyard peach in Yugoslavia. In the United States, the Tennessee Naturals or Indian Peach fall into this category. While locally adapted in the wild and usually available in sufficient quantity, most of these seedlings do not satisfy the requirement for orchard uniformity, resistance to nematodes, tolerance to excess moisture, alkaline soil and diseases when grown in intense culture. The persistance in their use is more associated with nursery tradition than to agreement as to their worth.

The second source of peach pits is derived from named cultivars usually utilized in the country's processing industry. When supplied by the cannery, the source is reasonably pure, abundant and cheap. Examples are as follows: Halford and Lovell, United States, Canada, Mexico; Polara and Sims, Argentina; Golden Queen, Elberta and Wright, Australia; Bauladi and 198/12 Lesley, Israel; Kakamas or

Table 4. Rootstock Sources Currently Used, Data from Survey.

A. Prunus persica

1. Seedlings: Wild types, Commercial Cultivars, Rootstock Selections
2. Interspecific hybrids: Nemaguard (seeds), GF 677 (clone)

B. Other than *P. persica*

1. Plums: Brompton, GF 43, Myroblan selections
2. Misc. species:

P. davidiana	*P. behimi*
P. amygdalus	*P. salicinia* Triton cv
P. armenica	*P. cerasifera* x *P. munsoniana* (Marianna)
P. insititia	*P. domestica* x *P. spinosa* (Damas 1869)

Du Plessi, South Africa and Zimbabwe; Cape de Boscq and Conserva Brazil; Paula a Moscatel Uruguay; and Balc Elita in Romania. Used as rootstocks, these sources have the same inherent weakness as the wild types. Intensive and expensive cultural practices and site selection are used to minimize their faults.

In several countries, specific rootstock cultivars are grown in seed orchards. They have been selected primarily on the basis of one specific quality such as: nematode resistance, disease resistance or hardiness. Examples in the pure *P. persica* form are found in GF 305 use in France and southern Europe; Pisa #5 and #6 selected in Italy; Okinawa utilized in Australia, S. Africa and Japan; Siberian-C and Harrow Blood, in Canada; B-Va 1, 2, 3 or 4 selected in Czechoslovakia; Ohatsumomo in Japan and Bailey or Boone County and Rutgers Red Leaf in the United States. These stocks, though now used commercially, have a limited future as their problem solving ability is limited to a specific problem; while multiple problems exist at most orchard sites. Though used universally these seedling stocks are also universally considered as marginally satisfactory.

Two interspecific hybrid rootstocks (Table 4) have reached a significant degree of acceptance in international usage. Nemaguard (*P. persica* x *P. davidiana*, seed propagated), is used widely in geographic regions where winter injury does not occur, where soils are not wet and bacterial canker incidence is low. It is the most important rootstock in California. It lacks productivity in soils without nematodes when compared with other rootstocks. GF 677, (initials stand for Grande Ferrade) from France, is a peach almond hybrid, clonaly propagated, rapidly gaining in world wide acceptance for its excellent adaptability to calcareous soils, expanded tolerance to wet or dry soils and strong vigor on replant soils. Though somewhat difficult to propogate it is commercially produced by tissue culture in Italy and France or by cuttings.

The use of stocks other than *P. persica* (Table 4), and its hybrids on a commercial scale is limited to regional use. The Brompton plum is used on heavy soils. The French Damas 1869 (*P. domestica* x *P. spinosa* natural hybrid) is widely used in the Mediterranean area where soils are heavy and calcareous, particularly in those regions having seasonal excess moisture in winter or spring. Unfortunately, this fine stock is not compatible with some nectarines and suckers badly in orchards. The Marianna, clone 2624, (*P. cerasifera* x *P. munsoniana*) of US origin and Myroblan *(P. cerasifera)* OP selections B or 29C are stocks used almost exclusively in Australia and California where root rots are common. Marianna stocks, however, are canker susceptible, weak on anchorage and somewhat variable. The Myroblan stocks have some compatibility problems. A French selection M-2052 may have potential. The French plum *(P. domestica)* GF 43 has excellent vigor, resistance to root and collar rot, well suited for wet soils, but somewhat sensitive to replant site stress. The St. Julien clone GF 655.2 *(P. insititia)* is slightly less vigorous than GF 43 or Brompton but does well on heavy soils. It is used in France, Italy and Greece for orchards of increased planting density. This stock is not adapted to alkaline soils. *P. davidiana* clone BD-SU-I developed in Czechoslovakia has local use. Several nations, particularly India, utilize local selections of *P. amygdalus*, *P. armeniaca*, *P. behimi* and *P. salicinia* Triton cv., but report a limited future use due to incompatibility. The specific rootstocks currently recommended in each country are tabulated in Table 5.

CANDIDATE ROOTSTOCK

Rootstock improvement and evaluation throughout the peach producing nations have resulted in bringing forth candidates for commercial use (Table 6). All are at a development state where limited commercial trials would be a worthy venture. The attributes of these candidates cannot be discussed in detail. A few points are to be indicated: Monclar (S-2489) (France) is a chlorosis resistant vigorous seed stock; Rubira (S2605) (France) is a red leaf seed stock with moderate vigor, tolerant to crown gall and highly productive; Higama (S-2543) (France) is a seedstock with excellent vigor and nematode resistance; S-2535 (from France but of Korean origin) is a somewhat dwarfing seedstock; Tzim pe Tao and Chui-Lum-Tao (being developed in Canada) have excellent hardiness characteristics plus moderate nematode tolerance. Greece has brought forth I.D.-20, a local wild selection, with resistance to nematodes and chlorosis along with I.D.-37, a clonal selection from the nematode resistance S-37 stock. Pisa #5 and 6 are selections from the wild (made in

Table 5. Current Use[1] and Recommended Use[2] of Peach Rootstocks, Data from Survey.

	Wild Type Seedlings	Cultivar Seedlings	Rootstock Selections	Interspecific Hybrids, peach	Plum Species	Other Species
Argentina	A 1	B 3		C 2		
Australia		A 1	C	B 2	D	
Tasmania		A 1			B 2	
Brazil		A 1		B		
Canada		A	B 1		C 2	3
Chile		A 2		B 1		
Czechoslovakia			A 1	C 2		B
France	A		B 1	C 2	3	D
Greece	A 1		B 4	C 2	D 3	
Hungary	A 1					B
India	A 1					B 2
Israel		A 2		B 1		Own Roots
Italy	A 1			B 2	C 3	
Japan			A 1			
Korea		A 1				B
New Zealand		A 1				
Mexico	A 1	C 4	B 3	2		
Romania	A	C 1	2		B	
South Africa		A 1				
Spain	A 1			3	B 2	C
Taiwan	B 2					A 1
United States		A 1	B 2		C 3	
Uruguay		A 1				
Yugoslavia	A 1				B	
Zimbabwe		A 1				

[1]Letter indicates current use and priority.
[2]Number indicates recommended use and priority.

Italy) for homogeneity of stand on soils with no particular stress factors. Japan has developed four stocks R 32-10; 32-16; 33-1 and 33-3 from its screening program of wild peaches for nematode resistance. Ohatsumomo is a local stock choice in Japan and worthy of trial elsewhere. Romania has developed T-16 and T-163 from their evaluation of wild types, and recommends their use in that country. The Japanese peach hybrids (Akame x Juseito) R 26-2 and 27-1 and (Akame x Okinawa) R 15-2, 17-8 and 22-2 are homozygous for red leaf character and resistant to root knot nematodes.

In the interspecific hybrid arena, several peach x almond clones have been developed. Two clonal selections from Czechoslovakia (PA 5-3-6-64 and PA 216-863) have resistance to alkaline soils. GF 557 (France) came from a Shalil x almond seedling cross. It is similar to GF 677 but has nematode resistance. Clones MB 1 and 4 (originating in Hungary) are alkaline soil resistant. A vast number of peach x almond hybrids are currently undergoing selection tests in Spain and Yugoslavia. France has also 2 advanced selections of a peach x Marcoma almond. In California, redleaf nemaguard x Titan almond is being tested.

Peach plum hybrids have produced Myran a *P. belsiana* x Yunnan cross with tolerance to drought, poor soil,

Table 6. Peach Rootstock Candidates.

P. persica	
SELECTIONS	
Monclar (S-2489)	France
Rubira (S-2605)	France
Higama (S-2543)	France
(S-2535)	France
Tzim pe Tao	Canada
Chui Lum Tao	Canada
1-D-20	Greece
1-D-37	Greece
Pisa Sel #5 & 6	Italy
R 32-10; 32-16; 33-1; 33-3	Japan
Ohatsumomo	Japan
T 16, T 163	Romania
HYBRIDS	
R-15-2, 17-8, 22-2, 26-2, 27-1	Japan

INTERSPECIFIC HYBRIDS		
1. Peach x Almond		
5-3-6-65, 216 - 863	clone	Czechoslovakia
GF 557	clone	France
MB 1 and 4	clone	Hungary
Selections		Spain, Yugoslavia
Peach x Marcoma 2 clones		France
2. Peach x Plum		
Myran		France
P 115-95 (115-5, 104, 102)		U.S.
4G 816		U.S. (Zaiger)
3. Plum Hybrids		
Myrabi (P2032)		France
P 2037 *Besseyi* x *Cerasifera*		France
4. Plum		
Marianna 29-C		Australia
Myroblan B		Australia
BD-SU-I *(P. davidiana)*		Czechoslovakia
5. *P. insitatia*		
St. Julien A, x Plum (Hybrids #1, #2)		France
St. Julien 53.7; 655.2		France
Pollizo de Murcia		Spain

root knot, armillaria and verticillium. Zaiger's new rootstock 4G 816 has also a Belsiana background, and possesses similar characteristics plus dwarfing. From California we also have P 115-95, a red leaf nemaguard type now being evaluated, as well as sister seedlings P 115-5, 105 and 102.

Plum hybrid candidates include Myrabi (P2032), a myroblan plum compatible with peach, tolerant to wet soil and with good vigor on heavy textured soils. It may have some armillaria resistance. Also from France is P2037, a *P. beseyi* x *P. cerasifera* natural hybrid with an early cropping tendency, nematode immunity and water tolerance. Since the Marianna 2624 selection has wide usage in California, it deserves further testing world wide and should be used for added clonal selection or hybridization. BD-SU-I, a *P. davidiana* cross from Czechoslovakia, is recommended there where hardiness and perhaps vigor control are its attributes.

There have been some developments in *P. insititia* gene pool. St. Julien "A" from England and "X" from Australia are under test for size control. Since St. Julien seedlings are variable due to partial self sterility, France has developed hybrids #1 (St. Julien x Common Mussel plum) and #2 (St. Julien x Brompton). The hybrid seeds are produced in isolation orchards. These hybrids have uniformly increased compatibility, resistance to chlorosis and adaptation to heavy soil. Hybrid #2 has added collar rot resistance. Pollizo de Murcia from Spain may possibly be a *P. insititia* selection.

FUTURE DEVELOPMENTS

While progress has been made, there is considerable need and opportunity for further rootstock improvement. It will involve innovative and creative research approaches, perhaps involving genetic engineering. The approximately 200 Prunus species serve as a valuable genetic resource. The listed species (Table 7) can be genetically joined with *P. persica* through hybridization or bridging hybrids, such as plum x apricot. These species contain genes to establish multiple sources of resistance to soil nematodes and soil associated diseases plus an array of attributes such as: compatibility, anchorage, hardiness, rooting character, water tolerance (excess or deficit), size control or nutrient utilization. As progress is made, rootstock refinements such as a full exploration of stock scion interactions as they affect in a positive way scion morphology,

Table 7. Resources for Peach Rootstock Improvement (found in these prunus species).

Prunus americana

amygdalus	davidiana	mandschurica	persica
andersoni	domestica	martima	pumila
armeniaca	hortulana	mira	siberica
besseyi	insititia	mume	subcordata
cerasifera	kansuensis	munsoniana	tomentosa
dasycarpa	ketunnikowii	nigra	umbellata

and further utilization of interspecific hybrids such as: Marianna plums, Belsiana plums, Plumcots and pentaploid plums bearing characteristic and bloom physiology will become prime targets for the rootstock researchers.

The importance of peach rootstock research is recognized by virtue of programs of varying intensity in all 25 countries surveyed. These programs range from detailed evaluation of wild types in Argentina, Italy, Brazil and Mexico. Expanded trials have been made of existing rootstocks, such as the S-97 regional peach rootstock project in the U.S. to highly developed screening and development programs through hybridization in Canada, Czechoslovakia, Greece, Japan, Hungary, Romania, Spain, Yugoslavia, U.S. and France. The greatest breeding approach appears to be with the initial peach almond crossing. Clonal propagation methods and cultivar rooting studies in Israel, U.S., Italy and Zimbabwe are also under way. Without question, the premier peach rootstock development program is that conducted by Drs. R. Bernhard, C. Grasselly and G. Salesses at the Grande Ferrade research station near Bordeaux, France. There is little doubt that there is a world of interest and activity concerning peach rootstocks.

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References

1. Bernhard, R., C. Grasselly and G. Salasses. 1979. Du Symposium de la Selection Fruits Eucarpia. Amelioration de Arbes Fruitiers. Eucarpia Section Fruits 277-286.
2. Childers, N. F. 1975. The Peach Section III, 62-132.
3. Day, L. H. 1953. Rootstocks For Stone Fruits. Cal. Agri. Exp. Sta. Ext. Bul. 736. 76 pp.
4. Garrett, C.M.E. 1979. Screening *Prunus* rootstocks for resistance to bacterial canker caused by Pseudomonas morsprunorum. J. Hort. Sci. 54:189-193.
5. Layne, R. C. 1974. Breeding peach rootstocks for Canada and the Northern United States. Hort. Sci. 9(4):364-365.
6. Roberts, A. N. and M. N. Westwood. 1981. Rootstock studies with peach and Prunus subcordata Benth. Fruit Var. J. 35:12-20.
7. Rom, R. C. 1979. Peach rootstocks — opportunities and alternatives. Proc. Ark. State Hort. Soc. 108-110.
8. Rom, R. C. 1982. A new philosophy for peach rootstock development. Fruit Var. J. 36(2):34-37.
9. Sharpe, R. H. 1974. Breeding peach rootstocks for the Southern States. Hort. Sci. 9(4):362-363.
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I certify that the statements made by me above are correct and complete. Loren D. Tukey, Business Manager. September 29, 1982.