



Conservation and Utilization of Grape Germplasm

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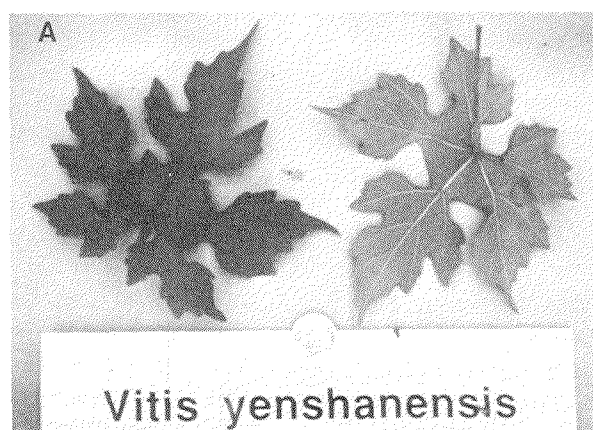


Figure A. Leaves of the native Chinese grapevine species, *Vitis yenshanensis*, which has unique leaf lobes. The vine carries good winter hardiness for northern climates.

The National Germplasm Repository for Apple and Grape (NGR) in Geneva, NY is a component of the National Plant Germplasm System. The mission of this national system is to collect, document, preserve, evaluate, and distribute plant genetic resources for continued improvement in the quality and production of economic crops important to the U.S. and to world agriculture. This is pursued in a coordinated effort by the USDA in cooperation with public and private U.S. and international organizations. Plant genetic resources are made freely available to all bona fide users for the benefit of mankind. The repository at Geneva, NY is part of the USDA, ARS, Plant Genetic Resources Unit, which also includes the Northeast Regional Plant Introduction Station and a research component.

The NGR at Geneva was established in 1984. The genetic resources (germplasm) for grapevines at Geneva exists as a living vineyard collection which is maintained on a 50-acre farm one mile north of the campus of the New York State Agricultural Experiment Station. Planting of the vineyards began in spring 1986. Five staff members and five part-

time employees manage both the grape and apple collections.

Distribution began from the repository collection in January 1988, and thus far 4,436 separate grape accessions have been distributed to 193 requestors, both in the U.S. and abroad. Materials have been sent to private, U.S. state, U.S. government and to foreign requestors. Many of these accessions have been distributed for the purpose of evaluating specific traits.

Germplasm Collections

The curators of grape repositories in both Geneva, NY and Davis, CA work closely with the Grape Crop Advisory Committee to define the procedures for acquisition and maintenance of the grape collection. The Davis repository preserves mostly non-hardy material (vinifera and other grape species), while Geneva has mostly American species, hybrids, and hardy Asian material. The advisory committee's criteria used for collecting germplasm accessions at both Geneva and Davis are as follows: 1) Collection of species and related genera receives top priority. This includes representatives from existing collections as well as those from natural populations. Much of the diversity of natural populations can be preserved as seed collections. 2) Antique cultivars and commercial cultivars which are not widely planted, especially those in danger of being lost, have second priority. This category includes table, wine, raisin and rootstock cultivars. Old cultivars of many crop species are often a source of desirable disease and insect resistance and make better parental material as compared to non-domesticated species. 3) Interspecific hybrids and unique breeding-program selections are last priority. These are

preserved very selectively as those having unique traits. Included among these are tetraploid cultivars with large berry size.

Based on these criteria, the Geneva collection now contains 1,313 grape accessions.

Of these, there are 437 *Vitis* species accessions representing 34 different species (358 species clones and 79 seed/seedling populations). There are 444 cultivars and 432 hybrids and/or rootstocks. Currently, two vines each of 1,045 clonal accessions are established on a total of six acres. Sixty of these are listed as virus-free, each having been indexed for presence of virus on four different indicator plants. An additional 105 accessions are in propagation stages prior to field planting. A greenhouse contains 100 accessions that are in quarantine from foreign sources. Seedling populations include 58 accessions (440 individuals) with populations as high as 25 individuals per accession.

In 1991, a review of the grape collections at both Geneva and Davis showed the collections to be rich in elite germplasm (i. e., cultivars, hybrids and enhanced material). In fact, there has been some redundancy of the accessions, based on analysis of pedigree and plant structure. About 156 accessions should be removed from the Geneva collection to allow room for higher priority germplasm. An additional 106 French-American hybrids are being analyzed for redundancy.

There are some major gaps to be filled from the world's elite material, particularly *vinifera*, of which most would be deposited in Davis. These include: 1) Northern *vinifera*s from Eastern Europe and Russia, including *amurensis* hybrids, 2) Spanish material, 3) North African/Middle Eastern material, 4) Asia Minor, 5) Northwest China, and 6) modern interspecific hybrids. These gaps must be filled by introducing clones through the quarantine system. Major gaps in species representation include: 1) Mexico/Central America/Caribbean species, 2) *vinifera* 'sylvestris', 3) *vinifera* from its center of origin (trans Caucasus), 4) Asiatic species, 5) related genera, and 6) regional representation of North American species. Most of these gaps can be filled by collecting seed.

Virus Testing/Quarantine

The Geneva repository is conducting a vigorous program in virus detection and virus eradication within grape accessions in cooperation with Dr. Dennis Gonsalves, Department of Plant Pathology, NYSAES, Geneva. Dr. Gonsalves also holds a permit to import foreign elite germplasm. The repository imports material through an agreement,

whereby mother plants are maintained in a repository greenhouse and virus indexing on woody-plant indicators is accomplished by repository personnel. Dr. Gonsalves evaluates these indicators after two and three years'



Figure B. Tissue-cultured grapevine accessions. Shoot tips are removed and then sub-cultured to eliminate viruses and to produce virus-free vines for field planting.



Figure C. Indexing for virus in the field. Here, buds of accessions are grown on an index species of grapevine, so that if buds contain viruses, the indicator will show field symptoms. The trellising system promotes healthy basal leaves which will best express virus symptoms.

growth. Currently, 100 accessions from Pakistan, China, Japan and Russia are in the quarantine program. A few were released from quarantine this year, and many others are expected to be released in 1994. Those that have been shown to be infected by viruses are being cleaned of virus using shoot-tip culture. The national system for grape quarantine is in transition, with the recent addition of the National Grapevine Importation Facility in Davis, CA. This facility is administered by Foundation Plant Materials Service on a fee-for-service basis. The Davis importation facility is mainly for commercial introductions, and it has not addressed the issue of germplasm introduction.

Dr. Gonsalves' program has produced antisera to two biotypes of the Grapevine Leafroll Virus (GLRV). The ELISA test (enzyme-linked immunosorbent assay) using these antisera has been validated with 'Cabernet Franc' as the woody indicator. The ELISA test is now routinely used to index for GLRV. This research project was conducted jointly by the Geneva repository and Dr. Gonsalves. Using the test, 50 of 825 repository grape accessions have been determined to be infected by the Type III isolate of GLRV.

Dr. Gonsalves' group continues research on GLRV and is also attempting to isolate the causal agent of *rupestris* Stem Pitting Virus (RSPV) and the Corky Bark Virus (CBV). RSPV is quite widespread in the repository collection as determined by indexing with *rupestris* 'St. George'. CBV is rare in the collection but it has been found in some foreign introductions.

The virus eradication research program is progressing with testing of shoot-tip culture in combination with thermotherapy and chemotherapy. Material known to be infected with GLRV, RSPV or CBV has been treated to produce offshoots that are now being tested serologically, with woody indicators, or by double-stranded RNA and electron microscopy.

Characterization, Evaluation and Documentation

Repository personnel are beginning to collect data on a minimal list of characters

needed for purposes of identifying all grapevine materials held at Geneva. These 24 characters are the same ones used in international databases. They concern phenological (growing season-related) characters and the structure of shoots, leaves, tendrils, clusters and berries. Phenological descriptors have been measured extensively over a 3-year period and are ready to be documented.

The Germplasm Resources Information Network (GRIN) is the official database of the National Plant Germplasm System which is maintained on a computer at the National Agricultural Library in Beltsville, MD. GRIN serves to unify information of interest about the plant germplasm in the system, including inventory control and order processing. Data in GRIN, including records on grape, are available to any plant scientist or researcher, grower, or user, worldwide. All accession records available from the literature were loaded into the GRIN record. These included pedigree, accession history (country of origin and collector/developer), and a short description of the material.

In addition, evaluation proposals submitted through the Crop Advisory Committee have been funded for cooperative researchers to return data to the repository for loading into GRIN. These projects include evaluation of cold hardiness, interrelation of phenology to cold hardiness, crown gall susceptibility, genetic analysis of closely related species, and screening the collection for resistance to foliar powdery mildew. These efforts will render the collection more useful to the user community.

Other Activities

Trueness-to-type tests have been completed on most of the collection. These tests were made by comparing specimens or characters to documented descriptions and by direct comparison to

material with the same name in different locations.

A cost-effective method to back up the grape collection is needed to assure that material is not lost from the collection. In collaboration with researchers at the National Seed Storage Laboratory at Colorado State University, the repository has been developing pilot projects (initially in apple) for long-term cold preservation (cryopreservation) of dormant buds. Through the process of dehydration of fully cold-acclimated tissue, it may be possible to store bud segments in liquid nitrogen at -196°C. A small trial with grapevines began in 1990. Cold-hardy types (*Vitis riparia* and 'Valiant') have been successfully cryopreserved by desiccation to 18% moisture prior to freezing. 'Riesling', however, survived neither desiccation nor liquid nitrogen treatment. Further studies are planned to determine how to recover live grape buds removed from the nitrogen and to develop cryopreservation protocols for desiccation-intolerant material. ■

If you would like more information about grape accessions at the Geneva repository or if you would like a listing of repository holdings, contact the author at:
Phone 315/787-2390 or FAX 315/787-2397.

TABLE 1. Cornell grape-related research projects funded for 1993 by the New York Wine and Grape Foundation.

Researcher	Cornell Department	Projects
Christopher Becker and Roger Pearson	Plant Pathology, Geneva	Epidemiology and control of black rot in grapevines
Thomas Burr	Plant Pathology, Geneva	Cultural and biological methods of controlling crown gall
Lee Creasy	Fruit & Vegetable Sciences, Ithaca	Resveratrol in U.S. grape products
Timothy Dennehy, Timothy Martinson and Alan Lakso	Entomology, and Horticultural Science Departments, Geneva	Use of the parasitic insect, <i>Anagrus epos</i> , to reduce insecticide use in control of eastern grape leafhopper
Richard Derksen	Agricultural & Biological Engineering, Ithaca	Vineyard spray application systems
David Gadoury, Roger Pearson and Robert Seem	Plant Pathology, Geneva	Ultraviolet light as a non-chemical control of grape disease
David Gadoury, Roger Pearson and Robert Seem	Plant Pathology, Geneva	Development of a practical model for use in managing grapevine powdery mildew

FROM THE EDITOR

Martin Goffinet



Each year I try to give our readers some idea of the types of research done on grapes, wine and juice in New York State, through grant monies administered by the New York Wine and Grape Foundation. The Foundation also matches research dollars generated by other groups, such as the New York Grape Production Research Fund. These dollars provide for a large part of the research done in grape breeding, culture, pest and disease control, and juice and wine quality at Cornell University. This and other funding help our grape industry remain competitive and allow New York to boast of the best grape

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Biological Control of Grape Leafhoppers

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A new research project investigating biological control of grape leafhoppers by a minute parasitic wasp is now underway. This beneficial insect, *Anagrus epos*, is adept at searching out and parasitizing grape leafhopper eggs. The 1/3 mm-long adults search for leafhopper eggs embedded in leaves and lay their own eggs inside them. The immature wasps then complete their development entirely within the leafhopper eggs, before emerging as adults and continuing the cycle. Each parasite kills one leafhopper before it can start damaging grape leaves.

This parasite is a proven biological control agent in California and Washington vineyards. Little is known about its biology or impact on leafhopper damage in the East. Drs. Tim Dennehy and Tim Martinson, Department of Entomology, at the Geneva Experiment Station, have begun research in this area. In surveys conducted in 1992, they found that

40% to 80% of leafhopper eggs were parasitized by *Anagrus epos*. These data were the first in the East showing that *Anagrus epos* has the potential for providing equally good biological control in New York.

Goals of the project are to determine what factors influence biological control of grape leafhoppers in vineyards. Research will focus on determining where *Anagrus epos* overwinters, when it invades vineyards, and the relative impact of fungicides and insecticides on this beneficial insect. Increased understanding of the biology of *Anagrus epos* will be valuable in finding ways to enhance biological control. The project is expected to last three years, and is funded by the USDA Northeast Regional IPM Grants Program and the New York Grape Production Research Fund in cooperation with the New York Wine and Grape Foundation. ■

Martin Goffinet	Horticultural Sciences, Geneva	Bud development/crop potential in Concord and Niagara
Dennis Gonsalves	Plant Pathology, Geneva	Eliminating rupestris stem-pitting virus from grapevines
Wesley Gunkel	Agricultural & Biological Engineering, Ithaca	Robotic grapevine pruning research
Thomas Henick-Kling	Food Science & Technology, Geneva	Survey of nitrogen content in New York grape musts
Alan Lakso	Horticultural Sciences, Geneva	Pruning and irrigation interactions on vine performance
Robert Pool	Horticultural Sciences, Geneva	Improving Concord production efficiency via canopy spacing and mechanization
Robert Pool	Horticultural Sciences, Geneva	Testing vinifera clones and varieties and their suitable rootstocks for New York production
Bruce Reisch	Horticultural Sciences, Geneva	Statewide evaluation of new grapevine varieties
Bruce Reisch	Horticultural Sciences, Geneva	Genetic technology to improve vine disease resistance
Gilbert Stoewsand	Food Science & Technology, Geneva	Wine components inhibiting ethyl carbamate-induced cancers
Alice Wise	Long Island Horticultural Research Lab, Riverhead	Evaluation of Chardonnay, Merlot and Cabernet sauvignon clones
Alice Wise	Long Island Horticultural Research Lab, Riverhead	Living mulches for under-trellis weed control

(Editor, continued)

research efforts in the country. Table 1 summarizes Cornell's grape research projects funded by the New York Wine and Grape Foundation for 1993. Project titles are reworded to save space.

In addition, the Wine Analytical Laboratory, Department of Food Science and Technology, New York State Agricultural Experiment Station, is also supported by the New York Wine and Grape Foundation. The wine lab is supported by service fees submitted by users, with the actual cost subsidized by the Foundation. Many wineries are still bottling some wines that might be in need of wine analysis. The wine lab will taste wine samples for free and then recommend the next step. Contact Thomas Henick-Kling, Food Science and Technology, for information on wine analysis. Phone: 315-787-2277. ■



UPCOMING EVENTS



The Second Nelson J. Shaulis Grape Symposium Set for July 13-14, 1993

The second N. J. Shaulis viticulture symposium, "Pruning Mechanization and Crop Control", co-sponsored by Cornell University and the Grape Production Research Fund, Inc., will be an in-depth presentation of the latest developments in mechanical pruning and crop control. This grower seminar will be held on the campus of Fredonia State University, Fredonia, NY, on July 13-14. The day-and-a-half meeting will feature speakers from Italy, Australia, California and Arkansas as well as from New York. There will also be a tour of vineyards and research plots. Dr. Shaulis will give the first presentation. Speakers and topics include:

- N. J. Shaulis, Cornell University, Geneva, NY.
Maintaining competitiveness through research — a 50 year perspective
- A. N. Lakso, Cornell University, Geneva, NY.
Viticultural and physiological parameters limiting yield
- K. Sommer, Division of Horticulture, CSIRO, Merbein, Victoria, Australia.
How minimal and machine pruning influence the vine canopy and leaf function
- P. Clingeleffer, Division of Horticulture, CSIRO, Merbein, Victoria, Australia.
Vine response to modified pruning practices
- R. M. Pool, Cornell University, Geneva, NY.
Predicting and controlling crop of machine or minimal pruned grapevines
- C. Becker, Cornell University, Geneva, NY.
Disease and insect management considerations for machine pruned vineyards
- C. Intrieri, University of Bologna, Bologna, Italy.
Evolution of equipment for the Italian mechanized vineyard
- W. Gunkel, and J. Throop, Cornell University, Ithaca, NY.
Development of "intelligent" pruning and thinning machines
- G. DeGolier, Westfield, New York.
Adapting the vineyard and your equipment for mechanized production
- D. Luvisi, University of California, Bakersfield, California.
Mechanization in the California wine industry
- J. Morris, University of Arkansas, Fayetteville, Arkansas.
Implications of mechanized pruning for yield and quality
- T. Mitchell, Vintners International, Hammondsport, NY.
Impact of mechanization on cost of production at Taylor Wine Co.

The \$85 registration fee includes a barbecue dinner, bus tour of on-site demonstrations and written proceedings. Contact: David Peterson, Cornell Cooperative Extension, 110 Court St., Penn Yan, NY 14527. Phone: (315)-536-3381; FAX: (315)-536-5145.

The Annual Meeting of the American Society for Enology & Viticulture/Eastern Section will take place July 15-16 at the Genesee Plaza Holiday Inn, Rochester, NY. The meeting brings together researchers and wine industry personnel and is an excellent opportunity to exchange views across disciplines and to gain in-depth information in basic and applied research. The program includes seminars on grape production and enology, student paper competition, a trade show, the "Regional Wine Showcase," wine evaluation session, and a banquet with featured wines. For more information, contact David V. Peterson, Finger Lakes Regional Grape Program, 110 Court St., Penn Yan, NY. Phone: 315-536-3381; FAX: 315-536-5145.

ANNOUNCEMENTS

Dr. Roger C. Pearson Dies

Roger C. Pearson, Professor of Plant Pathology at Cornell University's New York State Agricultural Experiment Station, Geneva, died on April 4, 1993, at the age of 46. After starting his research and extension responsibilities in the Hudson Valley on tree fruits in 1973, Dr. Pearson began his distinguished career as a grape pathologist upon moving to Geneva in 1977. Prior to his death, Dr. Pearson had statewide responsibility for research and extension on fungal diseases of grapevines in New York. His research on powdery mildew's life cycle on grapevines gained him particular recognition and revolutionized strategies for controlling this disease. He also discovered that angular leaf scorch and grapevine yellows, both related to serious diseases in Europe, were potential threats to New York grape growing.

Dr. Pearson's research was closely followed by application of results for improved disease management. He traveled extensively throughout New York during the growing season to talk to grape growers. He simultaneously managed research projects on biological control of powdery mildew with *Ampelomyces quisqualis*; biological control of downy mildew with fungal antagonists; epidemiology and control of powdery mildew, downy mildew, black rot, angular leaf scorch, grapevine yellows, *Botrytis* bunch rot and *Phomopsis* cane and leaf spot. Numerous competitive grants were awarded him by the USDA, LISA, the New York State IPM program, and the New York Wine and Grape Foundation. In addition to numerous journal papers and several book chapters, Dr. Pearson co-edited and authored the internationally recognized APS Compendium of Grape Diseases.

Dr. Pearson's authoritative knowledge of grape diseases was respected world-wide. He was named a Research Fellow of the Alexander von Humboldt Foundation in

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1982. He was presented the Agway Award in 1990, and the Lee M. Hutchins Award of the American Phytopathological Society in 1991. In 1982, he spent a six-month sabbatical researching grape fungal diseases in Germany and France, and, in 1988, he spent a sabbatical in Switzerland. His concern for others, his kindness, and his quality work were highly appreciated in his Department, at Cornell University, and throughout the world-wide scientific community. We have truly lost an outstanding scientist and a dear friend.

Dr. Timothy Dennehy Leaves Cornell

Timothy Dennehy, Associate Professor in the Department of Entomology, New York State Agricultural Experiment Station, Geneva, will be leaving Cornell University to take on the position of Extension Entomology Specialist at the University of Arizona, Tucson, Arizona. Dr. Dennehy was trained in entomology at the University of California at Davis. Since coming to the Geneva station in 1984, he has investigated grape leafhopper ecology and control, grape berry moth risk assessment and control, and he has been involved in biological and genetic studies of the grape phylloxera, as well as other biological control strategies for vineyard pests.

Dr. Timothy Dennehy Receives Grape Foundation Award

Dr. Timothy Dennehy, Associate Professor in the Department of Entomology, New York State Agricultural Experiment Station, Geneva, was among four people honored in May by the New York Wine and Grape Foundation for distinguished contributions to the state wine and grape industry. Dr. Dennehy received the Research Award for major contributions to grape growing, processing or other grape-oriented research. Dennehy's research involves the biology and population dynamics of insect pests in the vineyard ecosystem and a suitable integrated approach to grape pest management. He and Dr. Wendell Roelofs, chairman of the station's entomology department, did "exhaustive research" into the effectiveness of pheromones in control of insect infestation, particularly the grape berry moth. The use of pheromones, in conjunction with the berry moth risk assessment program, has reduced insecticide use for this pest by more than 70 percent and, in some cases, eliminated insecticide use. Grower costs and environmental costs have thus been substantially reduced. Dennehy was also honored for the excellent communication of his findings to the grower community through a series of monographs, newsletters and seminars.

American Society for Enology & Viticulture Scholarship Winners

Two Cornell graduate students at the New York State Agricultural Experiment Station, Geneva, have won prestigious awards from the American Society for Enology & Viticulture and ASEV/Eastern Section. **Muhammad Lodhi**, a graduate student in the grape breeding, has won two awards. The first is from the national society, from which he

received the ASEV Viticulture Scholarship for 1993-94. This award is given on the basis of academic excellence, research project and application of the proposed research to the field of enology and viticulture, as well as the future goals of the applicant. This award was presented at the annual meeting of ASEV in Sacramento, CA in June. Mr. Lodhi's second award is the Eastern Wine Industry Student Scholarship Award 1993, given by the ASEV/Eastern Section for the same reasons as the national award. It will be presented at the annual meeting of ASEV/ES at Rochester in July. Mr. Lodhi has worked on grapes and citrus in Pakistan, and has been studying the genetic map of grapevine chromosomes at the molecular level. His studies are designed to find DNA markers linked to important disease resistance genes, and to eventually use his genetic maps to find and clone important genes from grapes. He started his studies at Cornell in September, 1990 and is a graduate student in Plant Breeding, with a minor in Pomology.

Brigitte Martineau is the recipient of the ASEV/ES Eastern Wine Industry Student Award for the 1993-1994 academic year. This award will also be presented at the annual meeting of ASEV/ES at Rochester in July. Ms. Martineau received her award for her work in enology on the flavor production of malo-lactic bacteria in wine. She is a graduate student working in the enology program of Dr. Thomas Henick-Kling, Department of Food Science & Technology. She received her undergraduate degree at the Université Laval, in Quebec City. For her master's degree at the University of British Columbia in Vancouver, she worked on carbonic maceration in wine making. ■

Grape Extension Publications and Educational Materials

(Martin Goffinet, Editor)

Much information on grapes is generated through Cornell University's research and extension programs, both in verbal and written form. Growers and processors of New York grapes have continuing needs to improve their knowledge of this crop. Many states put out grape-related information which may be useful to our

readers. With this in mind, I am providing the following listing of grape extension publications available within the United States and Ontario, Canada. The U.S. publications were extracted from a listing for all fruit and nut publications which was authored by Glenn Taylor in the journal, HortTechnology, Jan./March 1992 issue.

Dr. Taylor graciously gave permission to print this listing. Southeastern states citing only muscadine references have not been included. I have also supplemented Dr. Taylor's listing of New York materials. States are listed alphabetically, followed by an address and other information to help you obtain a numbered citation. Write or call pertinent offices for information.

Arkansas: University of Arkansas, 316 Plant Science Building, Fayetteville, AR 72701

EL 563 Growing grapes in Arkansas
MP 190 Grape training and pruning

California: University of California, Agricultural Information & Publications, University of California, Davis, CA 95616

1906 Assessing alternative methods of pest control in raisin storage
1913 Harvesting and handling California table grapes for market
1923 A list of bibliographies and a selected list of publications that contain bibliographies on grapes, wine, and related subjects
2145 Interconversion tables for percentages of ethyl alcohol in water
2435 A permanent sprinkler system for deciduous orchards and vineyards
2743 Frost protection for North Coast vineyards
2780 Grape rootstock varieties
2915 Evaluations of wine grape varieties for Lodi
2946 How to appraise soil physical factors for irrigated vineyards
4020 Dessert, appetizer, and related flavored wines: the technology of their production
4056 Virus diseases of small fruits and grapevines
4087 Grapevine nutrition and fertilization in the San Joaquin Valley
21056 Salinity appraisal of soil and water for successful production of grapes
21182 Eutypa dieback of apricot and grape in California
21231 Grapevine physiology: how does a grapevine make sugar?
21429 Passive frost protection of trees and vines

Video Tapes (Contact Visual Media at 916-757-8980):

V/88-AC Odd jobs safety in the vineyard
V/88-AD Tractor safety in the vineyard
V/88-AE Pesticide safety in the vineyard
V/88-BM Safe pruning practices in the vineyard
V/88-BQ Back safety in the vineyard
V/88-BV Safe use of farm machinery R & M in the vineyard
V/88-BW Safe harvest practices in the vineyard
V/88-Z Work hazards in the vineyard
V/89-AV Monitoring soil moisture in vineyards

Colorado: Bulletin Room, 171 Aylesworth Hall SW, Colorado State University, Fort Collins, CO 80523. Phone: 303-491-6198

Unnumbered Grape growers guide

Illinois: J.W. Courter, Dixon Springs Agricultural Center, Rt. 1, Simpson, IL 62985. Phone: 618-695-2444

Hort Series Proceedings of the current year Illinois strawberry, small fruits and amateur winemakers school

Indiana: Publications Mailing Room, 301 South 2nd Street, Lafayette, IN 47905-1092

BP-4-2 Grape black rot

Kansas: Dr. Frank Morrison, Extension Horticulturist, Waters Hall 227, Manhattan, KS 66506. Phone: 913-532-6173

Unnumbered Commercial grape production in Kansas

Kentucky: Department of Agricultural Communications, 131 Scovell Hall, University of Kentucky, Lexington, KY 40456. Phone: 502-257-2657

PPA-27 Black rot of grapes
ID-90 Growing table grapes in Kentucky

Michigan: Bulletin Office, 10B Agriculture Hall, Michigan State University, East Lansing, MI 48824-1039

E0806 Vineyard preparation for nematode & virus disease control
E0897 Grape grader's manual — commercial
E1732 Common diseases of the grapevine in Michigan
E1935 Pruning grapevines
E2025 Culture of grapevines in Michigan
E2189 Cost of producing Concord grapes in Southwestern Michigan
VT021 Pruning grapes (Video Tape)

New Jersey: Publications Distribution Center, Cook College, Rutgers University, P.O. Box 231, New Brunswick, NJ 08903

FS253 Grape commercial pest control recommendations 1
FS254 Grape commercial pest control recommendations 2

New Mexico: Bulletin Office, Dept. Agricultural Information, Box 3AI, New Mexico State University, Las Cruces, NM 88003

400 H-22 Establishing wine grape vineyards in New Mexico
Cir 483 Growing grapes in New Mexico
Gd H-303 Pruning grapes to the four-arm kniffin system
Gd H-309 Grape cultivars for North-Central New Mexico
Gd H-311 Improving size and quality of seedless grapes
Gd H-315 Grape diseases

New York: Distribution Center, 7 Research Park, Cornell University, Ithaca, NY 14850. Phone: 607-255-2080

142RG 1993 New York and Pennsylvania pest management recommendations for grapes
143IB84 Homemade wine
147IB146 Control of wildlife damage in orchards and vineyards
155IB156 The home fruit planting (Includes grapes)
155S111 Cultural practices for commercial vineyards (color or b/w version)

(out late 1993) Wine and juice varieties for cool climates
(out late 1993) Table grape varieties for cool climates

Grape Fact Sheet Series (best gotten in sets):
102GFSG-D I Eutypa dieback

102GFSG-D II	Powdery mildew
102GFSG-D III	Botrytis bunch rot and blight
102GFSG-D IV	Black rot
102GFSG-D V	Downy mildew
102GFSG-D VI	Phomopsis cane and leaf spot
102GFSG-D VII	Crown gall
102GFSG-D VIII	Angular leaf scorch of grape
102GFSG-I, I	Grape berry moth
102GFSG-I, II	Grape cane gallmaker
102GFSG-I, III	Climbing cutworms
102GFSG-I, IV	Grape leafhopper
102GFSG-I, V	Grape cane girdler
102GFSG-I, VI	Grape flea beetle
102GFSG-I, VII	Grape rootworm
102GFSG-I, VIII	Grape tumid gallmaker

Video Tape: Pruning grapes

Bulletin Room, Jordan Hall, New York State Agricultural Experiment Station, Geneva, NY 14456. Phone: 315-787-2249

Bull. 821	Growing cold-tender grape varieties in New York (1968)
FLS 21	Lakemont and Suffolk Red seedless grapes named
FLS 22	Cayuga White, the first of a Finger Lakes series of wine grapes for New York
FLS 45	Resistant rootstocks for New York vineyards
FLS 68	Canadice and Glenora seedless grapes named
FLS 80	Grape varieties for New York State
FLS 89	Remilly Seedless grape
FLS 96	Horizon grape
FLS 109	A method for large scale <i>in vitro</i> propagation of <i>Vitis</i>
FLS 112	'Melody' grape
FLS 113	'Einset Seedless' grape
FLS 118	Preventing decomposition of agricultural chemicals by alkaline hydrolysis in the spray tank
FLS 120	Assessing the risk of grape berry both attack in New York vineyards
FLS 131	Shoot positioning native American (Concord-type) grapevines
FLS 132	'Chardone' grape
FLS 135	Pheromonal control of the grape berry moth: an effective alternative to conventional insecticides
FLS 138	Risk assessment for grape berry moth and guidelines for management of the eastern grape leafhopper
GFI, 1	Managing weeds in New York vineyards: I. Choosing a weed management program
GFI, 2	Managing weeds in New York vineyards: II. Chemical control of vineyard weeds
GFI, 3	Managing weeds in New York vineyards: III. Pre-emergence herbicides
GFI, 4	Managing weeds in New York vineyards: IV. Post-emergence herbicides
GFI, 5	Managing weeds in New York vineyards: V. Managing vineyard floors using no-tillage
Misc.	Concord table grapes. A manual for growers
Misc.	Proceedings of the first Nelson J. Shaulis viticulture symposium, 1991. Integrated pest management of grapevines: present and future strategies
Misc.	Growing <i>Vitis vinifera</i> grapes in New York State. I. Performance of new and interesting varieties. 1990 (A publication of the New York Wine & Grape Foundation)
Sch 3	Damage to grapevines by fossil fuel wastes and pollutants
Other Materials	Contact Dr. Thomas Henick-Kling, Dept. Food Science & Technology, NYSAES, Geneva, NY 14456. Phone: 315-787-2277

Chardonnay. Proceedings of a one-day seminar on the production of Chardonnay table wines in New York, 1988
 Proceedings of the 20th New York Wine Industry Workshop, Geneva, NY, 1991
 Proceedings of the 21st New York Wine Industry Workshop, Geneva, NY, 1992.
 Proceedings of the 22nd New York Wine Industry Workshop, Geneva, NY, 1993
 Proceedings of the 1989 New York Sparkling Wine Symposium
 Production methods in Champagne, 1991

Oklahoma: Central Mailing Services, Oklahoma State University, Stillwater, OK 74078-0550

CR-6221 Grape, blackberry, and strawberry insect disease control
F-7643 Black rot of grapes

Oregon: Publications Orders, Agricultural Communications, Oregon State University, Administrative Services Bldg. 422, Corvallis, OR 97331-2119. Phone: 503-737-2513

CI 655 Progress report of table grapes in the northern Willamette Valley
PNW 220 Controlling damage of vertebrate pests to grapes

Pennsylvania: Publications Distribution Center, 112 Agricultural Administration Bldg., University Park, PA 16802. Phone: 814-865-6713

UL168 1993 New York and Pennsylvania pest management recommendations for grapes

Tennessee: Extension Plant and Soil Science, Box 1071, University of Tennessee, Knoxville, TN 37901-1071

Info #148 Grape production
Info #175 Coping with winter injury in vineyards
Pub 718 Growing grapes in Tennessee
SP307F Training and pruning grapevines

Texas: Texas A&M University, Extension Horticulture, 225 Hort/Forestry Bldg., College Station, TX 77843. Phone: 409-845-7341

B-1424 Texas vineyard guide
B-1425 Growing grapes in Texas
HHB201 Texas vineyard management handbook 1990
Hort 3 A blue ribbon harvest — grape video tape

Virginia: Virginia Tech Extension Division Distribution Center, 112 Landsdowne St., Blacksburg, VA 24061-0512

Pub.423-006 The cost of growing wine grapes in Virginia
Pub.423-010 What the beginner should know about grape growing in Virginia
Pub.444-567 Major insect and mite pests of grapes in Virginia
Pub.450-232 Grape diseases and control in Virginia

W. Virginia: WVU Experiment Farm, P.O. Box 609, Kearneysville, WV 25430. Phone: 304-267-4712

Unnumbered Growing grapes in West Virginia
Unnumbered West Virginia horticultural recommendations for orchard and vineyard trellises

Wisconsin: Agricultural Bulletin Room 245, 30 North Murray St., Madison, WI 53715. Phone: 608-262-3346

A1656 Growing grapes in Wisconsin

Ontario, CD (Courtesy of K. Helen Fisher, Vineland Station) Consumer Information Centre, Ontario Ministry of Agriculture & Food, 801 Bay St., Toronto, Ontario, M7A 2B2. Telephone: 416-326-3400. FAX: 416-326-3409

Agdex No.: Title and warehouse number:
200/0 Fruit cultivars, a guide for commercial growers. (Warehouse No. 430)
200/0 Fruit production recommendations (Biennial with updates) (Warehouse No. 360)
200/0 Orchard sprayers (Warehouse No. 373)
200/0 Site selection for growing grapes in the Niagara Peninsula
206/532 Leaf analyses for fruit crop nutrition (Warehouse No. 91-012)

- 212/632 Diseases of grape in Ontario (Warehouse No. 87-014)
- 212/632 Insect pests of grape in Ontario (Warehouse No. 87-013)
- 212/632 Pest management programme for grapes (Warehouse No. 82-036)
- 231/600 Insect and disease identification guide for grapes (Warehouse No. 90-200)
- 231/612 Grape phylloxera (Warehouse No. 88-125)
- 231/624 Grape berry moth (Warehouse No. 90-098)
- 231/634 Botrytis bunch rot of grapes (Warehouse No. 90-002)
- 231/634 Downy mildew of grape (Warehouse No. 90-125)
- 231/634 Phomopsis cane and leaf spot of grape (Warehouse No. 90-123)
- 231/634 Powdery mildew of grape (Warehouse No. 90-001)
- 800/0 Fruit tree census: grapes 1991
- 820/0 Apple, peach and grape: estimated establishment costs (annual)
- 820/0 Fruit crops: estimated production costs (annual)

Available through: Independent Studies, Ontario Agricultural College, University of Guelph, Guelph, Ontario, N1G 2W1 Canada.
 Telephone: 519-767-5050. FAX: 519-824-9813

Course No. 606 Correspondence course in viticulture and oenology. Includes video tape: Pruning and training the grape



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Question: _____

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Geneva, NY 14456