

*DELHI*  
*Research Station*  
*1933 - 1983*

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Aerial view of Delhi Research Station

**E. K. Walker**

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# Contents

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Preface, 3

Foreword, 3

Chapter 1

Founding of the Delhi Tobacco Substation, 4

Chapter 2

Early years 1933–1945, 5

Chapter 3

Postwar years 1946–1961, 10

Chapter 4

Delhi Research Station 1962–1982, 17

Appendix, 30



## Preface

Preparation of this history was somewhat easier than I had anticipated, principally because of records maintained on personnel changes, on additions or modifications to the physical facilities, and on research programs and results both as a substation of Harrow before 1962 and as an experimental farm and research station thereafter.

Former Directors Dr. Ford Stinson and Mr. Lea Vickery were most helpful in providing certain information pertaining to all except recent phases of the history. Current staff members have also been very supportive and helpful with suggestions and photographs. I am grateful also for certain photographs supplied by *Delhi News Record*, Harrow Research Station, Dr. Radhey Pandeya of the Delhi Research Station staff, and Communications Branch in Ottawa.

The history emphasizes the sequence of research programs initiated to solve industry problems, the extent of involvement directly with the industry in extension-type activities, changes in the physical facilities, and the personnel responsible for making the station the center of flue-cured tobacco research in Canada and one of the principal tobacco research centers in the world.



E. K. Walker  
Delhi, Ont.  
March 1983

## Foreword

The year 1983 marks the 50th anniversary of the Agriculture Canada Research Station at Delhi, Ontario. The station, founded in 1933 as a substation of Harrow Research Station, was devoted exclusively to production research on flue-cured tobacco in the new tobacco belt area of Norfolk and neighboring counties. In 1962, the substation was elevated to experimental farm status and in 1967 to full research station status. In 1981, the program was expanded to include new crops.

Tremendous advances have been made in the tobacco industry over the past 50 years and Delhi Research Station has been at the center of it. The station enjoys a unique and personal relationship with tobacco growers, not only in Ontario, but also in the Atlantic and Quebec regions, as well as with members of all facets of the tobacco industry.

Our 50th anniversary gives us a unique opportunity to record the history of Delhi Research Station and its associated impact on the Canadian tobacco industry. We were most pleased when Ken Walker of our staff undertook this task as part of our golden anniversary activities. Its completion is a testament to his dedicated efforts.

We would like to thank Ken and all those who helped by providing information and photographs that were used in the preparation of this account of Delhi Research Station. I know it will be of interest, not only to all who have taken part in this great tobacco industry, but to others as well.



P. Wade Johnson  
Director



# CHAPTER 1

## Founding of the Delhi Tobacco Substation

Tobacco research in Canada was begun by the Government of Canada in 1906 when a Tobacco Branch was formed in Ottawa to investigate methods of improving leaf quality in order to develop the domestic and export markets. A few years later, the branch became the Tobacco Division of the Canada Department of Agriculture. In 1909, Harrow Tobacco Station, subsequently Harrow Experimental Farm, was founded to conduct studies with burley and flue-cured tobacco within, up until then, the principal production area for these types. Although burley had been grown in extreme southwestern Ontario for more than a century before 1909, the first flue-cured tobacco was not grown there until 1910. Demand was primarily for burley at this time and the first commercial crops of flue-cured tobacco were not grown until 1913. By 1924, less than 2830 ha were devoted to flue-cured tobacco as compared to 8100 ha for burley and other air-cured types. A shift toward higher consumption of cigarettes, which was attributed to World War I, resulted in increased demand for flue-cured tobacco. This demand continued to accelerate during the 1920s, and production began to shift from the "old belt" in Essex and Kent counties to the "new belt" in Norfolk and neighboring counties.

This shift in production was partly because of insufficient production potential in the "old belt," where available land was being increasingly utilized for other field and horticultural crops. At the same time, the Norfolk sand plain, being of inherently low fertility and ecologically more adapted for flue-cured tobacco than for other crops, was underutilized and the mixed farming economy was in a relatively depressed state. After suitability of the Norfolk sand plain for flue-cured tobacco production was demonstrated in the mid-1920s by experienced tobacco growers from the USA, comparatively rapid promotion and development in the area occurred. Development was greatly enhanced by soil studies conducted in the area by Professors Gerald Ruhnke and Frank Morwick of the Ontario Agricultural College (O.A.C.) in the late 1920s and by publication of the first soil map of the area. Because of the expanded hectareage in the "new belt" and differences in soil, climate, and tobacco-quality factors between the two tobacco-growing areas, it was decided to initiate experimental work in the "new belt."

After preliminary testing and searching for a suitable location by Herb Murwin, Superintendent of the Harrow station, and Prof. Ruhnke of O.A.C., a substation of the Harrow station was founded in 1933 on 20 ha of leased land about 4 km west of Delhi in Norfolk County to conduct research on flue-cured tobacco. Lloyd Haslam, the first Officer in Charge of the new substation was directly responsible to the Superintendent at Harrow for both administration and program.



G. Lloyd Haslam, Officer in Charge, 1933–1935



## CHAPTER 2

### Early years

#### 1933–1945

Facilities constructed on the substation for the first year were a two-storey packbarn and three curing kilns. The packbarn (16 × 10 m) provided an office, grading and steaming rooms, machinery storage, and a stable for two horses on the first floor, and tobacco storage space on the second floor. The kilns were built for the curing of primed tobacco: previous to this time, much of the flue-cured tobacco was stalk-cut for curing. The capacity of each kiln was 900–950 laths (80 000–95 000 leaves), and each kiln was equipped with two coal-burning furnaces and a system of flue pipes that extended back and forth below tobacco in the kiln from each furnace. At the center rear, the pipe from each furnace joined an outlet to an exterior stack that extended above the roof. One of these kilns is still being used, but with a modern curing system. The original packbarn is also still in use, although the current structure is much larger because of additions. A glass sash greenhouse covering about 250 m<sup>2</sup> was built in the winter of 1933 and used for production of substation seedlings until 1953. The first cottage was built in 1934 for the farm foreman, and beginning in 1936 one of the rooms, which had an outside entrance, served as the substation office for about 16 years.



#### top

Two of the first four buildings on the substation. The curing kiln in left background was one of three such kilns. The packbarn provided an office, grading and steaming rooms, machinery storage, and a stable for two horses on the first floor, and tobacco storage space on the second floor.

#### middle

1938

Curing kiln equipped with two coal-burning furnaces. A flue-pipe system, which extended from inner end of each furnace back and forth near floor, joined at the center rear of the kiln and exited to an exterior stack. Coal is in foreground.



#### bottom

Cottage built in the winter of 1934. One room became the office in 1936 and the remainder was living quarters for the foreman.





An implement shed and workshop was built in 1936, with an addition in 1939 for horses, previously housed in the packbarn, and for storage. In 1936, as well, part of the packbarn was made into laboratories. Additional curing kilns were built in 1939 and 1940, and a residence for the Officer in Charge was built in 1939. An experimental kiln for curing was built in 1943 and a shed for cattle was constructed in 1945. The latter was built to accommodate steers in a steer feeding-manure study: in the one cash crop economy manure was obtainable only from general farms and the study was one of many attempts to diversify the farm economy, provide manure, and improve soil fertility.

The establishment at Delhi was so successful that in 1938 the government purchased the leased property and an adjoining 20 ha.

Initial research in 1933 involved fertilizer experiments and variety trials on 6 ha. During this early period, studies conducted on flue-cured tobacco at Harrow were gradually transferred to Delhi. Bob Haslam of the Harrow station, brother of Lloyd Haslam, was involved with the breeding program at the Delhi substation until 1959. In these early years, before the advent of registered seed growers, seed for growers was produced for sale on the substation. After 1942, the substation produced only foundation seed for multiplication and sale by registered seed growers. Beginning in 1940, equipment for seed cleaning was located on the substation for the convenience of growers producing their own seed; until that time, growers had to go to Harrow for this purpose.

Many cultural problems arose in the first year because 1210 ha of seedlings in the area were destroyed by sand blowing during the transplanting period, and a late spring frost on 14 June destroyed 200 ha. In 1933, approximately 12 160 ha (old and new belts) were grown, with an average yield of 1006 kg ha. This compares with approximately 38 850 ha and 2400 kg ha today. The vulnerability of sandy flue-cured soils to wind erosion and drought, and of plants to hail and late spring and early fall frosts was soon realized. In these early years, much of the research program of the substation was directed toward either maintenance or improvement of soil stability, fertility, and organic matter content through studies of windbreaks, crop rotations, tillage, and fertilization. Detrimental effects of drought seriously curtailed production potential and remained uncorrected until irrigation systems became



available in the 1950s. Other vagaries of weather such as frost and hail remain uncorrected to date.

Research on crop effects, short rotations, cultural practices, diseases, and fertilizer ratios commenced in 1934, and variety trials were extended to principal soil types in the area. Cultural practices concerned planting distances, topping heights, suckering, and harvesting. Disease studies involved research on tobacco mosaic virus (TMV) in cooperation with the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario. Variety trials in 1934 included U.S. varieties, strains from the breeding program at Harrow, and hybrids produced at the Tobacco Division in Ottawa. The number of plots required for the 1934 program was 650. For comparison, there were 4600 plots for the 1981 program. Drought, hail, frost, wind, and wireworm injury seriously affected and delayed maturity of the 1934 crop, which had already been reduced in hectareage from 1933 to decrease the exportable surplus. Although only 9525 tonnes of flue-cured tobacco were produced in 1934, amounts of only 3175 tonnes for burley tobacco and 680 tonnes for dark tobacco were indicative of the declining importance of these types in total tobacco production.

Research in fertilization intensified from 1935 to 1940 with additional staff members, but the main thrust of the program was unchanged. Progress was curtailed during the war years with the departure of staff for either industry or war service, and with shortage of labor. Availability of labor became a critical problem for flue-cured tobacco production from 1943 to 1945: permits were required from the National Selective Service for anyone to work on a tobacco farm. The concentrated labor requirements during the harvesting period were partially met by the use of army units. Shortage of labor was critical for all agricultural production, and there was considerable movement of people in groups to meet emergency situations. Ford Stinson, Officer in Charge of the substation at this time, participated in a harvest excursion to Alberta in September 1943 in lieu of his annual leave, following tobacco harvest.

The only year-round employees at the substation in 1933 were Lloyd Haslam, Officer in Charge, and Fred Moore, farm foreman. To stay within the budget, operational staff, in addition to Mr. Moore, were laid off each year from the end of the stripping operation until the start of the seedbed preparation the next year. In May 1935, Lloyd Haslam resigned to accept a

position with Imperial Tobacco Company, and Ford Stinson, who was a student laborer at the Harrow station in 1932 and 1933, and a research assistant there in 1934, was appointed to fill his position. For a few months between the departure of Lloyd Haslam and the arrival of Ford Stinson, the program of the substation was under the direction of Oscar Williams, Experimental Farm Assistant, from the Harrow station.

During the depression and its aftermath the chief restraint was financial. Within the confines of budget, ad hoc arrangements to expedite approved research objectives were usually permitted if not actually encouraged. In practice, new staff appointments were considered virtually out of the question. Increasing research commitments were met by hiring university graduates as casual employees on an hourly rated basis and giving them the title of either graduate laborer or assistant. Summer student assistants from high schools and universities were selected and hired similarly. All the research personnel at the substation during this period were in these categories. Even Ford Stinson, despite his position of responsibility, remained as an hourly rated employee until September 1937, when he was classified as Experimental Farm Assistant, Grade 2. Mr. Stinson obtained his M.S.A. from the University of Toronto in 1938 while maintaining full-time duties on the substation. Other than for Ford Stinson and, after 1937, Lea Vickery, the research staff had relatively short tenure. All such personnel, including Messrs. Stinson and Vickery, were either involved in or became involved in part-time graduate studies.

This system of upgrading research skills added flexibility by allowing a shift of focus as needs and opportunities were encountered. For example, in 1935 Ken McPhee, who was engaged by the chemistry department of Ontario Agricultural College (O.A.C.) for the college year, was employed by the Tobacco Division and seconded to the substation for the growing season. Besides work on tracing the fate of potassium in the soil, Mr. McPhee prepared and preserved tissue samples of tobacco on a regular schedule during each season to provide a basis for chemical and physiological studies by Gordon Ward, Tobacco Division, within existing laboratory facilities in Ottawa. Mr. McPhee returned to the O.A.C. each fall to do laboratory analyses, teach students, and take graduate courses. He received his M.S.A. in 1937 and was engaged by a company in industry as a food chemist shortly thereaf-



Ford A. Stinson, Officer in Charge, 1935–1949

opposite page • top  
1934

Missing plants as a result of blowing sand

opposite page • middle  
1939

Disking a mature crop of rye. In the rye-tobacco rotation still employed, the mature crop, with or without combining, is disked under to add organic material, and volunteer or reseeded stands thereafter provide winter cover and green manure before tobacco. After tobacco, rye is seeded to provide winter cover and a rye crop for the next year.

opposite page • bottom  
1934

Tobacco mosaic virus (TMV) plot. The center row is 100 percent affected with TMV by inoculation of seedlings prior to transplanting

1943

Left to right: Dr. N. T. Nelson, Chief, Tobacco Division, Ottawa, Dr. F. A. Stinson, Officer in Charge, Delhi substation; and Mr. H. F. Murwin, Superintendent, Experimental Farm, Harrow, at an experimental curing unit.



ter. Mr. McPhee retired as President from this company a few years ago.

Eddie Moore, B.S.A., was an assistant to Mr. Stinson in 1936 and 1937, but was appointed to succeed the late Oscar Williams as assistant at Harrow in 1937. Mr. Moore resigned in 1943, returned to the "new belt," and became the first registered tobacco seed grower. Howard Horton was hired by the Tobacco Division to succeed Ken McPhee. He continued with the plant sampling work for Ottawa and, as well, studied soil sampling techniques and rapid soil-testing procedures. He returned to work and study at O.A.C. each fall. In November 1940, after receiving his M.S.A., Mr. Horton accepted a position with the fertilizer industry, where he pursued a successful career until his retirement.

Lea Vickery was employed as a student assistant during the summer of 1937 and returned to O.A.C. that fall for his senior year. In 1938, he commenced duties as an assistant at Delhi, where he remained, except for his graduate work toward an M.S. at Michigan State University in 1941-1942, service with the R.C.A.F. from 1942 to 1945, and work transfer studies at North

Carolina State University at Raleigh in 1948 and 1949, until his retirement in 1975. Mr. Vickery started a tobacco seed business in Delhi after retirement.

Art Willis was employed as a student assistant during the summer of 1938 and returned to O.A.C. that fall for his senior year. In 1939, he became an assistant at Delhi to Mr. Stinson, along with Messrs. Horton and Vickery, until December, when he accepted a position with the soils department at O.A.C. Expertise in plant pathology and entomology during these early years was provided by staff of the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, and of the Entomology Laboratory, Chatham, Ontario.

Office and laboratory space was at a premium in these early years. Originally, the office consisted of a room partitioned off in the packbarn. This was vacated when the office was moved to a room of the foreman's cottage in late 1934. The office consisted only of this one room until 1947 when the foreman vacated the cottage. Meanwhile, Ken McPhee, and later Howard Horton, used the room in the packbarn as a summer laboratory for six seasons. Although electricity was available at the substation in 1934, it was 1936 before a telephone on a party line could be obtained for the office. At that time the party line had 13 customers, one of which



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was seasonal to serve a retail outlet for fresh peaches. Because the time available for incoming and outgoing calls was minimal, nearly all administrative communication was done either by mail or by telegram. A private line was installed for the office in 1945.

Operational personnel employed in 1933 and 1934, namely Fred Moore and Howard Priester, remained at the substation until 1944 and 1941, respectively. Carl Priester, brother of Howard Priester, and Jim Stanford also were employed during 1933 and 1934. Fred Moore was succeeded by Jim Stanford as foreman in 1944. The first record of office and clerical staff is for August 1939, with the appointment of Alfred Judd as clerk. Other clerks employed during this period were Gilman Scofield, Vivian Wilbur, and Elizabeth Stumpf.

The transfer of research results to growers during these early years was mainly done by research personnel through personal interviews, meetings, press reports, and farmers' bulletins. The extension branch of the Ontario Department of Agriculture did not undertake to advise farmers on tobacco production, but agricultural representatives arranged grower meetings from time to time with substation staff as resource personnel. To handle farm visits and extend the soil-testing service to tobacco growers, O.A.C., through its chemistry department, opened an office in Tillsonburg during each growing season beginning in the late 1930s. The first fieldman, Mr. R. J. Stallwood, liaised with farmers, substation staff, and Peter Newell of the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, who had summer quarters near Simcoe. Despite lack of close contact, there was a productive and harmonious relationship among the scientists involved. In the off-season, Mr. Stallwood returned to the O.A.C., where he served as a dean of residence during the college year. When Mr. Stallwood enlisted in the army in 1940, Bill Ewen continued this work for several seasons during the war years. After the war, no extension assistance was available until 1955.

An important aspect of the substation's visibility with respect to flue-cured tobacco growers was initiated on 2 August 1934 when 400 visitors attended the first field day. This annual event now attracts as many as 5000 visitors. In the early years, field day addresses from invited speakers were given either in the open or in a large

tent on the grounds, followed by a walking tour of the plots. Since the mid-1950s this event has expanded to include conducted wagon tours, equipment and research displays, and machinery demonstrations, with addresses of speakers given in the bush park. The bush park was developed in the late 1940s and has been used to date for this purpose. Serving lemonade to guests has become traditional at all field days.

Close cooperation existed among tobacco research personnel in Canada at this time, and annual conferences convened by Dr. N. T. Nelson, Chief, Tobacco Division, Ottawa, were held to discuss programs, results thereof, and upcoming research plans. These conferences brought together workers from Ottawa, Harrow, St. Catharines, and Delhi in Ontario; L'Assomption and Farnham in Quebec; and Summerland in British Columbia. After 1935, there was also representation from the Entomology Laboratory in Chatham.





## CHAPTER 3

### Postwar years

#### 1946–1961

Other than two cottages and their accompanying garages built in 1947 and 1948, there was little addition to the physical facilities in the immediate postwar era. Although these cottages were built originally as residences for the teamster and farm foreman, respectively, they became residences for the farm foreman and research personnel after 1949. Until this time, only frame buildings were constructed. In 1953, a one-storey brick building ( $9.1 \times 18.2$  m) was constructed to provide offices for administrative, research, and clerical personnel on the first floor and laboratories in the basement. The cottage previously used to provide an office and living quarters was used for offices and laboratories from 1949 to 1953, and as a residence for research personnel from 1953 to 1960. In 1960, this cottage reverted to use for offices and laboratories to overcome crowding in the main office after the arrival of Ontario Department of Agriculture extension personnel in 1955. The cottages built in 1947 and 1948 were used as residences until 1965 and 1966, respectively. From those dates until the present they have provided office and laboratory space for an entomologist and a plant pathologist, respectively.

The original greenhouse built in the winter of 1933–1934 was replaced in 1954 by a high-quality glass greenhouse ( $9.75 \times 65.8$  m). An addition was made to this greenhouse a few years later. A heat-

ed greenhouse ( $7.62 \times 15.8$  m) was also built in 1954 and a similar unheated greenhouse ( $9.75 \times 23.8$  m) was constructed alongside it in 1959. A headerhouse, built in 1954, was extended for both greenhouses and beyond in 1961 and converted to chemical laboratories the same year.

Two new kilns were built in 1954 to conduct forced-air curing studies in cooperation with tobacco companies and the Ontario Research Foundation, and additions to the implement shed and workshop were constructed in 1956. In 1958, a large cement block addition to the original packbarn was built to house controlled environment chambers, drying chambers, and seed-cleaning equipment.

Cost increases continued to outpace expansion of the substation's budget for some time after the war's end, and urgent research had to be curtailed. While he was working with an experimental kiln, developed in 1943, Ford Stinson concluded that progress in automation, and thereby improvement in the curing process, depended upon a clearer understanding of the chemical and physiological changes concurrent with maturation and curing. To further his knowledge in this area, a transfer of work was arranged to North Carolina State University at Raleigh, where comprehensive research on curing was developing rapidly. The transfer, which was initially for 1 year beginning in September 1946, was extended by 6 months through March 1948. In 1947, meanwhile, Ron Rudd joined the research staff to conduct

soil and fertility studies. Lea Vickery had been Officer in Charge during this period and, anxious to upgrade his own research skills, arranged, on Ford Stinson's return, for a work transfer to North Carolina University at Raleigh from late 1948 to June 1949. In 1949, Ford Stinson was granted a Ph.D. in Agronomy (Soils) following studies on the identification and quantitative measurement of color components during maturation and curing. Shortly thereafter he accepted an appointment as Professor and Head of the Soils Department at O.A.C. In 1949, Lea Vickery was again in charge of the substation, but this time for a period of 26 years.

Within 2 years of his appointment at O.A.C., Ford Stinson accepted a 4-year contract as Director of Research for the Tobacco Research Board of Rhodesia and Nyasaland. This contract was extended to 5 years, and on his return, in 1956, Dr. Stinson took up farming near Perth, Ontario. The following year, 1957, he was again in contact with the tobacco industry as manager of the fledgling Ontario Flue-Cured Tobacco Growers' Marketing Board. After a difficult but successful term, he returned to farming for another 5 years. In 1962, he became head of the field crops section of the Kemptville Agricultural College, but within a few weeks was appointed by the Ontario Minister of Agriculture as chairman of an Enquiry Committee on the flue-cured tobacco industry of Ontario. The recommendations of this committee did a great deal to stabilize the

Front view of office building opened in 1953





marketing system, and to emphasize the need for escalated research on the crop. At the conclusion of this enquiry, Dr. Stinson returned to teaching and became Principal of the Kemptville Agricultural College in 1966. Dr. Stinson served in this capacity until his retirement in 1974.

Enlargement of the research staff began again in 1949 with the appointments of Art Rusnell and Ray Anderson to conduct soil and agronomic studies. Ken Grant, after receiving his M.S.A. from O.A.C., was appointed in 1950 to conduct variety and sucker control studies. Progress in staff enlargement was severely curtailed in 1950 with the resignations of Messrs. Rudd, Rusnell, and Anderson, and in 1953 with the resignation of Ken Grant, who left to form his own fertilizer company. Initial replacements for Messrs. Rudd, Rusnell, and Anderson in 1951 were Jim Elliot and Ken Walker, the former after obtaining his M.S.A. from O.A.C. and the latter his M.S. from Michigan State University. Mr. Walker had previously been employed as a student at the substation during the summers of 1947 and 1948. Ed Birch joined the staff in 1953, after obtaining his M.S.A. from O.A.C., to conduct studies on indirect fertilization and sucker control. Bob Bird was appointed in 1955, after graduation from O.A.C., to conduct studies on plant breeding, but he resigned in 1957 to become a high-school teacher. Mr. Birch also resigned in 1961 for the same reason. Bronius Povilaitis was appointed in 1957, after receiving his Ph.D. from McGill University, to conduct studies on plant breed-

ing and cytology. At the end of 1961 the research staff consisted of Messrs. Vickery, Elliot, Walker, and Povilaitis.

Beginning in 1950, expanded programs conducted by the research staff were greatly enhanced by the hiring of technical personnel. Elizabeth Back, an O.A.C. 1949 graduate, worked 6 months each year on an hourly basis until 1954. At that time, she was classified as a technician and worked with Jim Elliot; her responsibilities included conducting general chemical analyses. Gus Paloots, who had graduated from an Agricultural College in Estonia before the war and spent several years at a research station in Sweden prior to emigration, was hired in 1951 to conduct studies under the direction of the Officer in Charge. He also worked on an hourly basis until 1954 when he was classified as a technician. Mr. Paloots was primarily involved in variety testing and sucker control studies and, with the resignations of personnel involved in plant breeding, provided continuous staff involvement in this important area until the arrival of Dr. Povilaitis.

Until 1952, clerical staff was limited to one clerk. Don Lee served as clerk from 1947 to 1950 when he accepted the position of office manager at Harrow. He subsequently became administrative officer there and retired in 1982. Floyd Thomas succeeded Mr. Lee at Delhi in 1950. In 1952, the clerical staff included a typist.

**left**  
Lea S. Vickery, Officer in Charge, 1949–1962; Superintendent, 1962–1967; Director, 1967–1975

**right**  
1947  
Cockshutt transplanter, with Oscar Wright driving horses and Tom Curran planting on left.





**top left**  
1960  
Holland transplanter, with (left to right) Stan Dickey, Oscar Robbins, and Leonard Vaerewych



**top right**  
1978  
Holland transplanter with Mary Soen planting container-grown seedlings and Mike Soot driving. Some growers now produce seedlings in containers



**right**  
Preparing plots of harvested leaves for curing, 1954. Left to right: Gus Paloots, technician cutting; Eg Math, Shirley Carroll, tying leaves on table; Alma Paloots and John Dickey handing leaves for tying

**opposite page • top**  
Grading tobacco, 1957  
Gus Paloots, technician and Alma Paloots weighing lot of graded leaves

**opposite page • bottom**  
Baling tobacco, 1957  
Fred Howse preparing to bale press leaves for market

Several typists were hired during the 1946–1961 period, with most staying for 2–3 years; Muriel Cnockaert, who was hired in 1959, stayed 11 years.

Operational staff was increased during the 1946–1961 period, particularly in 1951 and 1952. Woodrow Wilson was foreman in 1947, Harry Sinden from 1948 to 1950, Scott Carroll from 1951 to 1955, Charles Heffren from 1956 to 1959, and Pat Murray from 1960 to 1961. Operational employees with long tenure who started during this period were Oscar Robbins, Fred Howse, Stan Dickey, Orval Hyndman, Henry Nettling, and Leonard Vaerewych.

Research projects undertaken from 1946 to 1952 included relationship of climate to tobacco culture; fertilization of flue-cured tobacco; topping and suckering; rotations, rest crops, and cover crops; soil analysis; organic matter treatments for tobacco soils; breeding new strains of tobacco; testing foreign and domestic flue-cured varieties; tobacco curing; seed production; and rye varieties. There were one or more experiments in each of these projects. Release of the cultivar Delcrest, which was black root rot tolerant, was a significant development in this period. Delcrest became the most popular cultivar in the late 1940s and early 1950s.





forced-air curing, using a small experimental kiln, were conducted in the 1940s. This work was greatly expanded with the cooperative studies in the mid-1950s, and with studies in small, controlled environment chambers starting in 1958. At the same time, bulk curing, whereby densely packed leaves, held in place by spikes, are cured by means of high-volume forced air, was developed by research workers in North Carolina. Because of this significant development in curing, the substation purchased a commercial kiln from the USA for testing purposes in 1961. This was the first bulk kiln in Canada. About 40 percent of the kilns in Canada today are the bulk type, many of which have been designed locally. Most of the others are either conventional or low profile kilns equipped with low-volume downdraft, forced-air systems that were developed in Ontario during this period, as also were mechanical tying machines, kiln elevators, and priming aids.



The sudden and widespread appearance in 1955 and again in 1956 of a hitherto unfamiliar physiological leaf disorder, termed weather fleck, caused serious quality and yield losses and resulted in great concern to the tobacco industry. Accordingly, a large-scale program of identification, effect, and control was undertaken by all research workers on the substation in cooperation with others in the federal departments of Agriculture, National Health and Welfare, and Transport, and in the Imperial Tobacco Company and Ontario Research Foundation. Dr. F. D. H. Macdowall of the Tobacco Division in Ottawa was Chairman of this joint program conducted from 1957 to 1960. After 1960, the joint program was abandoned but pertinent research was continued at Delhi and other locations. Many of the chemical, plant physiology, and meteorology studies involved in the joint investigation were conducted at an experimental site near Lake Erie, because weather fleck intensified with proximity to the lake. The leaf disorder was found to be oxidant-induced and some control was achieved with tolerant cultivars, judicious use of irrigation water, variation in harvesting practices, and antioxidant sprays. Because of potential residue problems, however, no antioxidant sprays have been recommended for use.

The period from 1953 to 1961 saw important changes in the tobacco industry and in the research programs conducted by the substation. This period was significant from the standpoint of equipment development. Irrigation systems became available in the early 1950s and an important research program devoted to the development of recommendations for optimum utilization of supplementary water was initiated in 1953. Development studies in storage pond construction were undertaken in cooperation with the engineering department at O.A.C. in 1956, and a plastic-lined storage pond and shallow wells for maintenance of water level were pro-

vided. Significant developments were made in curing systems and kilns, and in mechanical equipment to load kilns, tie leaves on laths, and assist in priming. The substation provided impetus to developments in kilns and curing systems with comprehensive studies of forced-air curing of tobacco from 1954 to 1956 in cooperation with tobacco companies and the Ontario Research Foundation. Kiln structures were improved as a result of studies showing the value of structural features such as ridge ventilators, indirect bottom ventilators, vestibule entrances, and insulation for easier curing and fire prevention. Initial feasibility studies on





**top**  
 Late 1950s  
 Seedlings for transporting being piled by hand

**bottom**  
 1979  
 Seedlings for transporting being piled by machine. Most seedlings are piled by hand but an increasing number of growers now use the mechanical pile.

The period from 1953 to 1961 saw increased knowledge and awareness of the importance and interrelationship of chemical and physical characteristics to quality. At the same time, progress was made in the development of equipment and methodology for such analyses by the research staff. There were also developments and changes in methods of sucker control. Mineral oil or oil-water emulsions and the systemic material maleic hydrazide were just coming into use in the early 1950s, and the efficacy and influences of such treatments on leaf composition and quality were studied intensively. Fumigation of soil was initiated to limit damage from the root-lesion nematode *Pratylenchus penetrans*, which caused a disorder previously known as brown root rot. With the introduction of black root rot tolerant lines, 2-year rye-tobacco rotations were preferable to the longer rotations of rye-rye-tobacco, and rye and tobacco with other crops. The cultivar, White Gold, introduced in the mid-1950s, was superior to Delcrest and Hicks Broadleaf in its tolerance for black root rot and in quality and yield; this cultivar subsequently fell into disfavor, however, as it had little tolerance for weather fleck damage. The development of direct fertilization practices for tobacco and indirect fertilization practices for rye received attention during this period, and resulted in changes in fertilizer ratios, muriate to sulfate of potash ratios, and recommended fertilization practices for rye to maintain optimum fertility and organic matter levels. Nutrition studies with grey tobacco initiated during this period revealed the existence of an association between the leaf disorder and levels of pH and minor elements in the soil.

The effective transfer of research program results to growers was greatly enhanced in 1955 with the appointment by the Ontario Department of Agriculture of tobacco extension officers and clerical staff who were to be located at the substation. There had been no extension officers since the war, and earlier extension personnel had been physically separated from the research staff. Milt Watson and Ted Presant were the first of the newly appointed extension officers. Mr. Presant resigned in 1956 to take graduate studies and has been employed at the O.A.C. since receiving his M.S.A. He was replaced by Glenn McCann in 1958. Norm Sheidow joined Messrs. Watson and McCann in 1960. The current extension clerk, Wally Orth, has held this position since 1961. Prior to the arrival of the extension officers, the research staff had been responsible for both research and





extension and, beginning in 1952, extension responsibilities were increased by the initiation of winter grower meetings. The first two such meetings, one in 1952 and one in 1953, attracted about 800 people to each meeting. The meetings were so successful that they were held more often and at different locations in Ontario. The extension staff began to participate in these meetings after 1956. Research personnel still participate in them but the extension officers assume the responsibility for organization and program. The extension officers also assume a leading role in all extension activities, including field day talks and tours, farm problems, and radio broadcasts.

Publication of research results in the form of scientific papers in recognized, refereed journals became more of a requirement of research activities in the 1946–1961 period than in the early years of the substation. With minimal staff, large-scale programs, and extension responsibilities, there was less opportunity for the concentrated effort required for such means of communication. In addition, methods of analysis and modes of calculation and compilation were so laborious and time-consuming that output, by present stan-

**top**

1958

Plastic-lined irrigation pond with irrigation system in operation. The pond was constructed cooperatively with the University of Guelph in 1956. Water level is maintained from sand points

**bottom**

1959

Leaf with weather fleck. This oxidant-induced disorder appeared suddenly in 1955 and was the subject of a comprehensive interdisciplinary and interdepartmental research program relative to cause, effect and control from 1957 to 1960





**left**  
Field day in 1938  
Speeches were given in a large tent on the grounds.



**right**  
Field day during the 1960s  
Partial view of visitors in the bush park, listening to speeches.



dards, was limited. As in early years *The Lighter* continued to be one of the principal vehicles for publication of research results and reports, but more emphasis was directed toward publication in fully refereed journals such as the *Canadian Journal of Plant Science* and *Tobacco Science*. Because of frequent staff changes during the early part of the period, there was little output of scientific papers until the mid-1950s and only 10 such papers were published by the end of 1961. Subjects included relationship of fertilizer to quality and yield, chemical composition of grades, effects of maleic hydrazide on quality and chemical composition of grades, effects of sprinkler irrigation, effects of physical variables on rate of burn, effect of chlorine on hygroscopicity, influence of irrigation on weather fleck incidence, chemical control of weather fleck, and effects of temperature in the yellowing phase of curing. Seventeen papers were published in *The Lighter* on such topics as soil building and conservation, fertilization, frenching, growing tobacco without manure, sucker control, irrigation, soil types, curing, weather fleck, and variety comparisons. Two papers on weather fleck were published, one in *Research for Farmers*, and one in the *9th International Congress of Botany*. Research reports included one progress report from 1946 to 1952 for the Dominion Experimental Substation, and one for 1959–1960 within the progress report of those years for the Harrow Research Station. Results for the years 1953–1958 were included in annual reports of the Director, Experimental Farms Service. Bulletins were published on tobacco kiln construction, and tobacco soils and fertilizer requirements. Many feature extension articles were written by the research staff and published in grower-oriented magazines;

16 of these articles were prepared during the 1946–1961 period. Extension officers contributed 49 similar articles to these magazines from 1956 to 1961.

Prior to 1946, there was frequent contact among research workers in Canada but relatively little among those in different countries. In the late 1940s, a Tobacco Workers' Conference was initiated in the USA to provide a forum for tobacco research and to bring together research workers from the USA and other countries. These conferences have been held 1.5–2 years apart. Annual tobacco chemists' conferences were organized shortly thereafter. The *Tobacco Science* publication was an outgrowth of these conferences. The conferences and associated publications have, since inception, provided the principal means of contacting research workers with similar interests and of reaching, via publications, those most interested in tobacco research. Research workers at Delhi have contributed to these conferences and this was recognized in 1956 with the first Tobacco Workers' Conference held in Canada. Meanwhile, contacts with tobacco research workers in Canada were continued, although annual conferences were discontinued in the 1950s, except for annual trips to Harrow for seminar programs. Staff members also were involved during this period with conferences of the Agricultural Institute of Canada and the American Society of Agronomy, and the Director, Lea Vickery, attended the First International Tobacco Congress in France during 1956.



## CHAPTER 4

### Delhi Research Station

#### 1962–1982

On 1 April 1962 the Delhi establishment was designated as an experimental farm, with Lea Vickery as Superintendent. Thus a long, fruitful, and direct association with Harrow Research Station and its superintendents or directors and personnel thereof was terminated. There had been excellent cooperation and rapport with Superintendent, Herb Murwin, from 1933 to 1959, Director, Dr. Ward Koch, from 1959 to 1961, and all the research and administrative staff. Those personnel involved most directly with the Delhi substation had been Bob Haslam in plant breeding from 1933; Walter Scott in agronomy, curing, and leaf analysis from 1933; Harry Stover in plant pathology from 1947 to 1951; Dr. Bill Mountain in plant pathology from 1951; Dr. Zenon Patrick in plant pathology from 1952; and Don Lee in administration from 1950.

In 1967, the Delhi Experimental Farm became the Delhi Research Station, with Lea Vickery as Director.

The land area of the station was increased in 1965 with the purchase of an adjoining 20 ha farm. Purchase of this property added a set of farm buildings, including cottage, packbarn, storage sheds, and kilns, as well as a set of shallow wells for irrigation. Although modifications were made to the original cottage facilities during the period 1962–1972, no significant additions were made to the facilities until 1968. In 1962, the basement of the first cottage on the station was modified to pro-

vide laboratory space for plant science and plant breeding, while the first floor of the cottage built in 1948 was modified in 1968 for use by a plant pathologist. The cottage built in 1947 had been modified in 1965 for use by an entomologist. In the meantime, the library, which had been in the main office until 1967, was moved to the second floor of the first cottage, then to the basement of the plant pathology cottage in 1970. A programable calculator purchased in 1968 was located in the library and a larger one with printout capability was installed there in 1970. In 1970, the second floor of the first cottage was modified to accommodate these calculators, plus a computer terminal for accessing the central computing system in Ottawa; this system was fully operational after 1977.

In 1968, a large building (18.3 × 42.7 m) was constructed to house 150 curing chambers. Parts for these chambers were built by penitentiary inmates and then shipped to Delhi for assembly. Each chamber has a 15-lath capacity compared to the 1200-lath capacity of a conventional kiln, and is equipped with immersion-type electrical heaters for curing and subsequent conditioning of small lots of tobacco. The chambers permit adequate curing treatment for tobaccos that cannot be satisfactorily cured together in large conventional kilns because of differences in field treatment, maturity, or stalk position. Extensions were added to this building in 1969 and 1972 to provide stripping, sorting, conditioning, drying, and storage rooms, and facilities for conditioning equipment, a physical testing laboratory, and

offices. These extensions increased the length of the building to 82.9 m. A heated, compartmental, glass greenhouse (7.5 × 30.5 m) was built in 1971 next to the two greenhouses with attached chemical laboratory that had been completed in 1961, and was attached at one end to the previously constructed headerhouse laboratory. This greenhouse was built to provide isolation for entomology, plant pathology, plant physiology, and nutrition studies. In 1972, three additional greenhouses were built at other locations on the station for general and specialized seedling culture, plant pathology studies, and comparison of different structures. These additional greenhouses are standard glass (7.6 × 30.5 m), fiberglass (7.6 × 30.5 m), and double polyethylene-covered (7.6 × 15.3 m) structures. In 1970, an investigative program on smoking and health was initiated in cooperation with Health and Welfare Canada. That department provided much of the specialized laboratory equipment required for the program and, in 1975, a large steel-sided laboratory building (15.3 × 36.5 m), in which to conduct the studies, was provided jointly by Agriculture Canada and Health and Welfare Canada. Two bulk kilns were built in 1972 and two more were built in 1973 to provide facilities for the curing of chopped whole plant for sheet, a study conducted in cooperation with the Canadian Tobacco Manufacturers' Council (CTMC) and Engineering and Statistical Research Institute of Agriculture Canada, and to increase capacity for the curing of general



1968

Transplanting small seedlings into peat pot containers. *Left to right:* Bill Santo; Gord Webb; Doug Rogers, technician; Gerald Webb; Henry Nettling; Ted Docheff; and Dwain Ankersmit, technician.

top  
1977  
Inspecting greenhouse-grown plant. Left to right, Dr. Norman Ross, research scientist, and Dr. Nelson Ross, research scientist.



bottom  
1982  
Inspecting peanut plots. Left to right, Mit Watson, OMAF extension officer, Larry Scanlan, technician, Jim Elmer, research scientist, and Norman Shawlow, OMAF extension officer.

opposite page • left  
1973  
Bob VanParys, operation manager, hand watering seedbeds in a polyethylene-covered greenhouse.

opposite page • right  
1978  
Preparing plot tobacco for bulk rack curing. Left to right: Henry Nettling, Bob VanParys, Mike Norkus, Phyllis Meyer, Mary Soen, Madeline Williams, and Sarah Williams.



tobacco on the station. Another bulk kiln was built in 1974 and a storage building (7.6 × 5.3 m) was built in 1975. The last two structures were provided by CTMC for studies with chopped whole plant for sheet.

The Director's cottage was vacated in 1975 and parts of the first floor were modified for use as a meeting room and a library reading room. Since 1965, the basement of the entomology cottage had been used as a meeting room; before that time, meetings had been held in the library of the main office. Facilities for personnel of

the Crop Insurance Commission of Ontario were provided on the second floor of the plant pathology cottage from 1975 to 1979 and on the second floor of the Director's cottage after 1979. A specialist with the Agricultural Energy Centre of Ontario was provided with an office in the same location in 1981. In 1980, the library in the basement of the plant pathology cottage was moved to the basement of the Director's cottage, and, in 1982, the vacated area was converted into a lunchroom for research and administrative staff.





Beginning in 1977, some of the original buildings on the 20-ha farm purchased in 1965 were modified to provide facilities for personnel from the University of Guelph who were conducting a research program funded by Ontario Ministry of Agriculture and Food and Agriculture Canada on peanuts. This program terminated in 1980 and a new crops program, including peanuts and other crops, was added to the station's program in 1981. Further modification of the buildings on the new farm were made and some of the old buildings, including several kilns, the cottage, and a greenhouse, were removed from the site. In 1982, a plastic-lined storage pond was constructed at the kiln site on the new farm to supplement water storage for irrigation provided by the first storage pond built in 1956.

Other changes and additions were also taking place on the original building site. Two downdraft-type kilns were provided in 1978 and 1981 to upgrade the lath-curing capacity for station tobacco, and to provide curing facilities for the Delhi Engineering Research Group (DERG), which came into being as a cooperative program involving Agriculture Canada, Ontario Flue-Cured Tobacco Growers' Marketing Board (OFCTGMB), and CTMC, whereby OFCTGMB and CTMC were to fund the program and Agriculture Canada was to provide land and facilities. In 1978, DERG built an experimental bulk kiln of conventional capacity for the curing of bulk bins and modified a bulk kiln built in 1974 for the same purpose. The latter kiln was

modified back for bulk rack curing in 1982. Also in 1982, one of the bulk kilns built in 1973 that had three separate compartments, each with a furnace, for use in curing chopped plant, was modified for conventional bulk curing. At the same time, one of the bulk kilns built in 1972 for the curing of chopped plant was modified for the drying of peanuts. In addition, a number of small bulk chambers of varying capacity were built for research purposes by the station and by DERG during the 1978–1982 period and were located in close proximity to the other bulk kilns. A maintenance service building (15.3 × 22.9 m) was built in 1979 to provide facilities for DERG, maintenance personnel of the station, and a lunchroom for operational personnel. In 1980, the old implement shed and workshop, which had a small lunchroom attached, was demolished, and a new implement shed (15.3 × 48.8 m) was built to properly house an increasing inventory, including that of the DERG farm equipment. The period from 1977 to 1982 also saw modifications to portions of the old packbarn and its additions to provide laboratory facilities and equipment for plant breeding research and for plant pathology research with blue mold.

Permanent Agriculture Canada staff early in 1962 consisted of the Director, three research scientists, two technical personnel, two office and clerical personnel, and an operational staff of seven. Permanent Ontario Ministry of Agriculture and Food staff located on the substation

consisted of three extension officers and a clerk. There were several part-time employees as well. In 1962, Frank White, plant breeder with the Tobacco Division in Ottawa, was transferred, along with his breeding program for cigar filler and flue-cured tobacco, to Delhi. Also in 1962, the Tobacco Division was discontinued and the research personnel were transferred to either experimental farms or institutes. A general need for intensification of the research program on flue-cured tobacco was becoming apparent at this time. Serious and complex problems in areas such as disease and insect control required attention. Knowledge of weather fleck and grey tobacco, tobacco maturity and quality, and related genetical and environmental factors was unsatisfactory, and production factors affecting flavor, aroma, texture, and moisture equilibrium of tobacco had received little study. The need for more research and development in mechanization in order to reduce labor costs was identified. Much more information on the foregoing subjects was considered essential to permit adjustment to changing requirements of manufacturers and consumers. As a



**top**  
1978  
Dr. Bill Court, research scientist (*left*) and John Hendel, technician, with liquid chromatography equipment

**middle**  
1978  
Ken Walker, research scientist (*left*), and Bruce Reynolds, technician, with atomic absorption spectrophotometer

**bottom**  
1978  
Charles Caughill, technician, with gas chromatograph

**opposite page • top left**  
1978  
Brent Capell, technician, with pH meter

**opposite page • top right**  
1978  
Bob Pocs, technician, with Kjeldahl apparatus

**opposite page • bottom left**  
1978  
Dr. Bryan Zilkey, research scientist, classifying weeds from herbicide plots

**opposite page • bottom right**  
1974  
Inoculating plants in a black root rot nursery, Frank White (*left*) and Dr. Radhey Pandeya, research scientists.







result of these requirements for research, staff additions in disciplines new to Delhi began with the appointment of Tsung Lee, plant physiologist, in 1962. Further additions occurred in 1965, 1966, 1967, and 1969 with the appointment of Sobhy Gayed, plant pathologist; Nestor Rosa, plant physiologist; Hsien-Hua Cheng, entomologist; and Bryan Zilkey, plant physiologist, respectively. Dr. Zilkey was appointed to Dr. Lee's position, when he was transferred to London Research Institute in 1968. Prior to Dr. Gayed's appointment, expertise in plant pathology had been provided by the Dominion Laboratory of Plant Pathology, St. Catharines,

Ontario, before the war and by pathologists located at Harrow Research Station thereafter. However, pathologists at Harrow until 1966 and at Vineland Research Station thereafter continued to be involved in nematode control studies with Jim Elliot. Throughout the period up to Dr. Cheng's arrival on the station, expertise in entomology had been provided by the Entomology Laboratory, Chatham, Ontario. Jack Begg had been primarily responsible for such investigations since the early 1950s and, with the closure of the Chatham Laboratory in 1965, was slated for transfer to Delhi. In fact, Mr. Begg spent a major part of each summer on site during this period.



left

Dr. C. Frank Marks, Director, 1976–1981

right

Dr. P. Wade Johnson, Director, 1981–



He died in 1966. Radhey Pandeya, plant breeder, and William Court, chemist, joined the research staff in 1973. Dr. Pandeya replaced Dr. Povilaitis who retired in 1972. Dr. Court was required for the station's expanding role in smoke chemistry studies. Subsequent additions to the research staff have been agricultural or mechanical engineers hired by DERG and Robert Roy hired as a biologist for the new crops program. Three engineers were on site for relatively short periods from 1978 to 1980. The current incumbent, Dennis Stier, has been in the position since September 1980.

Toward the end of 1972, Ken Walker was Acting Director during Lea Vickery's absence on sick leave. Mr. Walker served in that capacity again from December 1975 until July 1976, during which time Mr. Vickery retired and Frank Marks arrived as the new Director. Dr. Marks accepted the position of Director, Harrow Research Station, in 1981 and Jim Elliot served as Acting Director during the period between the transfer of Dr. Marks and the arrival of the present Director, Wade Johnson. Prior to his appointment as director, Dr. Marks was on the research staff at Vineland Research Station, conducting nematology studies. Dr. Johnson also did nematology studies at Harrow and then at Vineland Research Station prior to his appointment as Director. In the early 1960s, Dr. Johnson had been employed for two summers as a student assistant at the Delhi station.

The technical staff was also increased in 1962 and succeeding years. Three technicians started in 1962 and 1963 but, except for Jim Hay, plant science, they had resigned by 1964. Mr. Hay resigned in 1971 and was replaced by Bruce Reynolds in 1972. Eleven technicians started in the 1964–1968 period, with three being replacements for resignations. Among this group, Dwain Ankersmit and Doug Rogers, plant breeding; Chuck Caughill, plant physiology; Dave Brown, plant pathology; Brent Capell, plant physiology; and Jim Hanlon, entomology, are still on staff. Another technician in this group, Tony Chiang, died in 1975, while Larry Scanlan resigned in 1977 to become area manager of the Crop Insurance Commission of Ontario, which is located on the station. Gus Paloots retired in 1971 and, in addition to Mr. Reynolds, nine technicians were hired thereafter to fill either existing or new positions. One of these technicians was a replacement for Ms. Elizabeth Back, who died in 1978. From this group of nine technicians, seven are currently on staff, namely, Ron Beyaert, Bob Pocs, Jackie Chipps, John Hendel, Lalitha Krishniah, Susan Riach, and Peter White.

The office staff consisting of Floyd Thomas and Muriel Cnockaert in 1962, was augmented in 1963 by a typist, when Muriel Cnockaert became the Superintendent's secretary. Accounting and personnel clerks and an office equipment operator were added later. Mr. Thomas, the office manager, retired in 1973, and was replaced by Arthur Strachan. Mr. Strachan, who transferred to Brandon Research

Station in 1974, was replaced by Eldon Ashby. Mr. Ashby became an administrative officer in 1978. Muriel Cnockaert resigned in 1967 but returned to the same position in 1972 and 1973. In addition to Muriel Cnockaert, there were several secretaries with short tenure until 1978. The current Director's secretary, Carol Size, started in 1973 as personnel clerk; the current typist–receptionist, Anne Schooley, started in 1975. Prior to 1975, there were also a number of typists with short tenure. Debbie Shearer replaced Carol Size as personnel clerk in 1979. Harold Winter, who became accounts clerk in 1973, retired in 1982 and was replaced by Joe Belliveau. Marg Fleming, who started on a part-time basis in 1966 as a calculator operator, has continued on this basis with responsibility for the programable calculator and computer terminal operation.

Operational personnel were also increased after 1962 and there is a current staff of 18 in this category. Until 1967, the farm foreman was head of farm operations. Ned Wolfer was farm foreman in 1962, followed by Scott Carroll from 1963 to 1965. After that time, there were temporary incumbents in that position until 1967. In 1967, Robert VanParys, who started in 1965, became operations manager, and Steve Sabo was appointed farm foreman. Plotmen hired at this time were Mike Norkus and Larry Wezse. Mr. Norkus retired in 1980 and was replaced by Gerald Webb, who first started in 1964. Stan Dickey was responsible for farm construction and maintenance from 1952 to 1982.





**top left**

1978

Anne Schooley, typist-receptionist, and Eldon Ashby, administrative officer



**top right**

1978

Carol Size, Director's secretary



**bottom left**

1978

Wally Orth, OMAF extension clerk, determining pH and soluble salt levels of farmer's muck sample.



**bottom right**

1978

Margaret Fleming, computer and terminal operator

at which time he retired and was replaced by Bill Owen. Maintenance staff had been augmented in 1967 with the appointment of Ted Docheff. Orval Hyndman was mainly responsible for the upkeep of grounds from 1955 until his retirement in 1974. Howard Caughill, who replaced Mr. Hyndman in 1974, retired in 1983. Current operational personnel with long tenure, in addition to the foregoing, are Henry Nettling from 1959, Carl Hyndman from 1966, Gordon Webb from 1966, and Madeline Williams from 1968. Oscar Robbins, who started in 1949, retired in 1976. Fred Howse, who started in 1951, died in 1975, and Harry Almas, who started in 1966, retired in 1982.

Tobacco extension officers of the Plant Industry Branch of the Ontario Ministry of Agriculture and Food (OMAF) located on the station in 1962 were Milt Watson, Glenn McCann, and Norm Sheidow. Mr. McCann, who resigned in 1965 to accept a position with the fertilizer industry, was replaced by Dave George. In 1968, Mr. George transferred to Harrow Research Station. After a few years at Harrow, he transferred to OMAF Administration in Toronto. Another extension officer, Les Frayne, with responsibilities for crops other than tobacco, was located on the station for a year thereafter. Currently, Messrs. Watson and Sheidow look after tobacco extension with some assistance from specialists with the Agricultural Representative Service in tobacco-growing

counties. In 1975, OMAF located an office of the Crop Insurance Commission of Ontario on the station with Frank Goodyear as area manager. In 1977, Mr. Goodyear was replaced by Larry Scanlan. Mike Columbus, an energy specialist from Agriculture Energy Centre, OMAF, has also been located on the station since 1981.





In 1962, the research program concerned for the most part an interdisciplinary approach to weather fleck control, nutrition studies on potassium and grey tobacco, nematode control, breeding for disease resistance and development of varieties, curing, maturity, and irrigation. Other than for some chemical control studies in plant pathology and continued selection for varietal tolerance, weather fleck studies have been phased out. Other subjects on the 1962 research program are still under investigation, although there has been a shift in emphasis. In soils and nutrition, this shift has been to studies in nitrogen fertilization, including effect of fumigation for nematode control, side-dressing, soil pH, and greenhouse fertilizers. Plant science studies have emphasized seedling production and other aspects of culture important for the attainment of optimum maturity such as topping and spacing; sucker control chemicals and techniques; physical and chemical characteristics of tobacco; frost control; mulches; post-cure conditioning and storage of tobacco; culture, harvest, and curing of chopped whole plant for sheet; ripening agents; and weed control. Plant physiology studies have escalated in the areas of growth regulators, chemical changes in curing, physiological maturity, smoke analysis, uptake and movement of pesticides in plants, and greenhouse environment. The main emphasis in genetics and plant breeding has continued to be the development of cultivars superior in disease resistance, quality, and yield, but techniques in this area have become more sophisticated in order to increase the range of variability for selection and to speed up the process of cultivar development. Examples of such techniques are the use of mutagenic agents and haploidy. Comprehensive studies on synthetics, interspecific gene transfer, hybrids, male sterile varieties, breeding of pale yellow lines, path coefficient analysis, and mutagenesis have been conducted or initiated, and increased attention has been given to breeding for optimum levels of chemical constituents important with respect to quality, flavor, and aroma.

Important cultivars released since 1962 have been Delcrest 66 in 1966, Delhi 34 in 1968, Delhi 76 in 1976, Nordel in 1979, Delgold in 1980, and Newdel, Islangold, and Windel in 1981. Islangold and Windel were released for use in the Atlantic tobacco-growing area. Delcrest, the first significant varietal release from the Delhi Station, was grown on a high percentage of the hectareage in the late 1940s and early 1950s. Thereafter, there was a gradual

increase in use of U.S. varieties, principally Hicks Broadleaf and NC2326. Release of Delcrest 66, an improved Delcrest, in 1966 did little to reverse this trend, but a significant switch to Delhi 34 occurred in the late 1960s and early 1970s. From 1972 onward, a significant shift to U.S. varieties, principally Virginia 115, reoccurred. Virginia 115 continued to be the major variety grown until 1980 but releases of Delhi 76 and Nordel resulted in an increasing proportion of Canadian varieties. With the release of Delgold in 1980 and Newdel in 1981, there has been a pronounced shift to Canadian varieties, principally Delgold, and Canadian varieties comprised about 80 percent of the 1982 crop in Ontario and Quebec. Islangold, which has become the most popular variety in the Maritime Provinces, represented about 80 percent of the crop there in 1982.

Following a serious outbreak of blue mold in 1979, there has been increased emphasis on breeding for resistance to this disease. Protection against blue mold has also been the most important aspect of plant pathology research since that time, but protection against black root rot and various fungal and bacterial diseases in greenhouse and field and in curing have received increasing attention as well. Entomology research on control of specific insects such as cutworms, hornworms, seed corn maggots, and wireworms has extended into studies of population dynamics and forecasts of treatment requirements. At the same time, there has been an increase in efficacy studies, with new materials replacing older ones that have been discontinued because of degree of persistence in the soil, residue levels in leaves, or toxicity. Increasing attention has been given since 1962 by all disciplines to residue levels of pesticides in order to conform with West German tolerances. Smoke preference studies of tobacco treated with experimental pesticides or growth regulators have been conducted on an annual basis since 1962 in cooperation with the domestic tobacco companies. Research on chemical and physical characteristics of tobacco has been increasing since 1962. This work has involved either the development of equipment, methods, or techniques for measurement or the utilization of established methods to determine relationships among chemical and physical characteristics and quality factors in the leaves or smoke therefrom. Studies of smoke chemistry have primarily concerned tar and nicotine and ratios thereof in the particulate phase, and levels of other compounds in the particulate and gaseous phases that may also be important with

**opposite page • top left**  
1978  
Mechanical harvester

**opposite page • top right**  
1978  
*Left to right:* Serge Loyer, Jay Antoszek, and Cyril VanLent moving bin with charger to the harvester for loading.

**opposite page • middle left**  
1978  
Loaded bin being oriented to curing position.

**opposite page • middle right**  
1978  
Jay Antoszek moving bin to kiln.

**opposite page • bottom left**  
1978  
Bins in kiln

**opposite page • bottom right**  
1978  
*Left to right:* Dr. C. Frank Marks, Director, and Ron Minshall, DERG engineer, observing bins being unloaded after curing by Glen Beyaert and Jay Antoszek, and leaves being baled by Cyril and Margaret VanLent.



**left**  
Plant protection staff, 1978

Left to right Dr Hsien-Hua Cheng, research scientist, entomology Dave Brown technician, plant pathology Dr Sobhy Gayed research scientist, plant pathology and Jim Hanlon, technician, entomology

**right**  
1980  
Bruce Reynold technician, examining an experimental core in a bulk-rack chamber



respect to potential carcinogenicity, flavor, and aroma.

In addition to the foregoing changes in existing programs, new programs were initiated on engineering research in 1978 and on new crops in 1981. The pace of mechanization changes in the industry begun in the 1950s, continued in the 1960s and 1970s, but research support was fragmented in the form of demonstration-type studies by tobacco companies, developments by industry in Canada and the USA, and some assistance from the Engineering and Statistical Research Institute of Agriculture Canada. Impetus for a coordinated approach to engineering research came with escalating energy costs, and the necessary vehicle for such research, on site, was finally realized in 1978 with the formation of DERG, a cooperative venture of Agriculture Canada with tobacco growers and buyers. Despite difficulties in an initial 3-year term, particularly with continuity of personnel, the program has been successful, and was extended in 1981 for another 5-year period. DERG has not only been important in adding another dimension to the research program, but has proven to be a successful forum for industry approach as a whole to serious problems and to research needs. The new crops program was initiated in 1981 to continue on-site studies conducted by station staff and by researchers from the University of

Guelph for several years with peanuts and other crops that have potential on the large hectareage of sandy soils that are not being used for tobacco, vegetables, and fruit.

With the expansion of research staff since 1962 there has been a pronounced increase in the publication of research results as scientific papers. Increases in support staff of technical, administrative, and operational categories, as well as improvements in technology, have greatly facilitated such means of communication. From 1962 to 1981, 150 scientific papers on station programs and 250 miscellaneous publications were published. From 1972 to 1981, miscellaneous publications included 47 articles for tobacco editions of newspapers or committee reports that were not categorized as publications after 1980. Principal journals for publication of research papers in decreasing order of numbers published have been *Tobacco Science*, *Canadian Journal of Plant Science*, *Canadian Entomologist*, *Canadian Journal of Genetics and Cytology*, *Canadian Journal of Botany*, *Canadian Journal of Soil Science*, *Physiologia Plantarum*, *Journal of Chromatography*, *Phytopathology*, *Plant Physiology*, and *Peanut Science*. The departmental publication, *The Lighter*, continued to be the principal means of communicating technical information to the tobacco industry here and abroad. During the period 1962-1981, 98 papers, reports, or articles were published in *The Lighter*. During the same period, 40 feature exten-





**top left**

1981  
Dennis Stier, DERG engineer, observing whole plant harvest with a modified corn-forage harvester. Chopped leaves and stalks were cured in specially designed boxes for industrial processing into homogenized sheet.

**top right**

Peanut production, 1981  
Bob Roy, biologist, shelling nuts in a plot sheller.

**bottom**

Peanut production, 1981  
Peter White, technician, working on an experimental peanut harvester

sion articles by the research staff and about 200 similar articles by the extension officers of OMAF were published in tobacco-grower magazines. In addition to the foregoing research and miscellaneous publications, research results have been included, usually on an annual basis, in Research Branch reports.

Besides the established programs under way on the station, research personnel have been called upon for assistance in

the tobacco-growing areas of Quebec and the Maritime Provinces, and in foreign countries. Lea Vickery has made trips abroad, before and after retirement, to several countries in Asia and Africa, and Jim Elliot visited Jamaica under the auspices of the Department of External Affairs in 1967. Mr. Vickery also attended international tobacco congresses overseas on several occasions, and participated with other government personnel, as well as elected officials, buyers, and growers,



**top**

1981

Dennis Stier, DERG engineer, with large bale box and hydraulic press for bale information

**bottom**

1981

*Left to right: Ken Walker, research scientist Norm Sheidow, OMAF extension officer, and Dr Wade Johnson, Director, observing experimental bales in an auction exchange of the Ontario Flue-Cured Tobacco Growers' Marketing Board.*



in several trade missions overseas.

Dr. Marks participated in two such trade missions during his tenure as Director, and Dr. Johnson has participated in one since he became Director in 1981. Dr. Marks has attended two international tobacco congresses and together with Mr. Walker visited tobacco research establishments in Japan in 1979. In 1979, Dr. Marks also went to Australia on a fact-finding mission concerning blue mold. He was accompanied by Messrs. Watson and Sheidow. Australian tobacco growers in Victoria, who financed a visit by Dr. Gayed in 1983 to obtain advice on black root rot control, have recently requested another visit.

In addition to visits abroad, many fact-finding visits are made to the USA, and many official scientific delegations are received on the station. During the past 10 years, there have been 15 such delegations, including the Peoples Republic of China, to study Canadian tobacco technology developed at Delhi. Every year, particularly in the summer months, there are numerous unofficial groups of scientists and or growers from tobacco-growing countries in Africa, Asia, Eastern and Western Europe, South America, Australasia and Oceania, and from the USA and Central America. Several graduate students from foreign countries have done their field and laboratory research for higher degrees at Delhi, and technical training has been provided for graduate students from several countries for periods up to 2 years.





Staff of Delhi Research Station, January 1983

*Left to right:*

*Back row:* Norm Sheidow (OMAF), Ron Beyaert, Steve Sabo, Ken Walker, Dave Brown, Bob Pocs, Doug Rogers, Jim Elliot, Dennis Stier (DERG), Lorne Boyd (DERG), Bruce Reynolds, Larry Wezse, Brent Capell, Chuck Caughill, Richard Muth, Bob Roy, and Dave Husul

*Third row:* Randy Marshall, Bill Owen, Radhey Pandeya, Sailen Mishra, Bill Court, Hsien-Hua Cheng, Milt Watson (OMAF), Jim Hanlon, Ted Docheff, Howard Caughill, Bob VanParys, Jerome Sobry, Peter White, Bob Compeau, and Carl Hyndman

*Second row:* Henry Nettling, Mike Dertinger, Mike Gubesch, Joe Belliveau, Wally Orth (OMAF), Sobhy Gayed, Wade Johnson, Eldon Ashby, Bryan Zilkey, Dwain Ankersmit, Gerald Webb, Joe Clapdorp (DERG), Nestor Rosa, and Gordon Webb

*Front row:* Debbie Shearer, Lalitha Krishniah, Jackie Chipps, Susan Riach, Debbie Ramer, Madeline Williams, Margaret Fleming, Anne Schooley, Mary Soen, and Carol Size  
*Absent:* John Hendel

Mr. Elliot advises tobacco growers in the Maritime Provinces on a regular basis and makes several trips each year for that purpose. Messrs. Pandeya, Walker, Gayed, and White have also been involved in such trips, although less frequently, usually either as invited speakers at grower meetings or in connection with variety trials. Messrs. Elliot, Walker, and Gayed have also been involved for several years with grower meetings in Quebec. Most research staff members have been involved with up to nine grower meetings a year in Ontario, although the extension officers are mainly responsible for program. In recent years, plant breeders Messrs. White and Pandeya have made several trips to Honduras for seed propagation in order to speed up variety release. Messrs. Walker, Rosa, and Stier, together with the extension officers from OMAF, have conducted about eight all-day curing schools a year for growers in recent years and the research staff members give lectures each year to agricultural students of Fanshawe College.

Formal meetings of tobacco workers in Canada, held annually during the early years of the station, became less frequent during the 1962–1982 period. However, there was an increase during this period in international contacts due to the continual participation by the research staff in the Tobacco Workers' and Tobacco Chemists' conferences. Other conferences of special interest on genetics, entomology, plant pathology, plant physiology, and chemistry have been attended less frequently. In

1973, the 25th Tobacco Workers' Conference was held in Canada. This was the second such conference to be held here. During the period 1962–1982, the Tobacco Chemists' Conference was held twice in Canada.

The transfer of results to growers via personal contact, meetings, articles, information bulletins, and other means has always been a major activity of the research staff. Since the location of OMAF extension officers at the station in the mid-1950s, the percentage of time spent on this activity has declined considerably. At the same time, however, there has been an increase in the scope and complexity of extension and the extension officers are less able now than formerly to handle all such activities. Annual field days became more sophisticated in the 1960s, and equipment displays, machinery demonstrations, and research displays were initiated. For many years, field days were 2-day rather than 1-day events. Wagon tours at these events began in the 1960s and have increased in popularity. Tobacco trade fairs are an innovation of the tobacco industry; these events are usually held annually and the station always participates with a research display. Recently, the station has become involved with displays and equipment for the Ontario Tobacco Museum in Delhi.

# Appendix

Permanent staff who have worked for at least one year at the Delhi Research Station.

## Agriculture Canada

### Directors

G. L. Haslam, *B.S.A.	1933–1935
F. A. Stinson, Ph.D.	1935–1949
L. S. Vickery, M.S.	1949–1975
C. F. Marks, Ph.D.	1976–1981
P. W. Johnson, Ph.D.	1981–

### Professional Staff

K. G. McPhee, M.S.A.	1935–1937
E. S. Moore, B.S.A.	1936–1937
H. A. Horton, M.S.A.	1937–1940
A. L. Willis, M.S.A.	1938–1939
L. S. Vickery, M.S.	1938–1949
R. B. Rudd, M.S.A.	1947–1950
A. R. Rusnell, B.S.A.	1949–1950
R. R. Anderson, B.S.A.	1949–1950
K. T. Grant, M.S.A.	1950–1953
J. M. Elliot, M.S.A.	1951–
E. K. Walker, M.S.	1951–
E. C. Birch, M.S.A.	1953–1961
R. J. Bird, B.S.A.	1955–1957
B. Povilaitis, Ph.D.	1957–1972
T. T. Lee, Ph.D.	1962–1968
F. H. White, M.Sc.	1962–1981
S. K. Gayed, Ph.D.	1965–
N. Rosa, Ph.D.	1966–
H. H. Cheng, Ph.D.	1967–
B. F. Zilkey, Ph.D.	1969–
R. S. Pandeya, Ph.D.	1973–
W. A. Court, Ph.D.	1973–
R. C. Roy, M.S.A.	1981–

### Administrative Officer

E. G. Ashby	1978–
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### Office and Clerical Staff

A. W. Judd	1939–1940
G. H. Scofield	1940–1941
V. M. Wilbur	1941–1942
E. Stumpf	1942–1946
H. Novakowski	1946–1947
D. H. Lee	1947–1950
F. E. Thomas	1950–1973
J. Saunders	1952–1955
E. Frew	1955–1957
H. Kora	1957–1959
M. Cnockaert	1959–1967
	1972–1973
M. Grant	1963–1966
M. Fleming	1966–
D. M. Marosevich	1966–1968
M. A. Baker	1968–1972
E. G. Ashby	1968–1972
	1975–1978
A. Clements	1969–1972
A. VanPuymbroeck	1972–1973
F. Gagnon	1972–1974
C. S. Size	1973–
A. W. Strachan	1973–1974
P. Dumoulin	1973–1975
H. A. Winter	1973–1982
D. Luciani	1974–1975
A. M. Schooley	1975–
J. Fry	1976–1978
D. A. Shearer	1979–
J. L. Belliveau	1982–

### Technical Staff

G. Paloots	1951–1971
M. E. Back, *B.S.A.	1951–1978
J. A. Hay	1962–1971
A. Couture	1962–1963
L. Chanyi	1963–1964
W. A. Taylor	1964–1966
W. D. Rogers	1964–
J. C. D. Ankersmit	1964–
T. L. Gill	1965–1966
M. D. Hyde	1966–1968
C. W. H. Caughill	1966–
D. A. Brown	1967–
B. B. Capell	1967–
J. J. Hanlon	1967–
H. C. Chiang*	1968–1975
L. G. Scanlan	1968–1977
L. B. Reynolds, B.S.A.	1972–
J. G. Hendel, B.Sc.	1974–
T. E. Dertinger	1977–1979
R. P. Beyaert	1978–
S. Moore, B.Sc.	1980–1981
R. Pocs	1980–
P. H. White, B.S.A.	1981–
S. M. Riach, B.Sc.	1981–
L. Krishniah, B.Sc.	1982–
J. W. Chipps	1982–





## Operational Staff

F. J. Moore	1934-1944
H. Priester	1934-1941
C. Priester	1936-1941
J. D. Stanford	1944-1946
W. Wilson	1946-1949
T. P. Curran	1947-1950
O. W. Wright	1947-1948
H. L. Sinden	1948-1950
F. T. Forsyth	1949-1950
O. E. Robbins	1949-1952
	1954-1976
F. D. Howse*	1951-1975
S. T. Dickey	1952-1982
W. S. Armstrong	1952-1956
L. Vaerewyck	1952-1964
S. Carroll	1951-1955
	1963-1965
C. A. Heffren*	1954-1959
G. L. Lee	1954-1958
H. Nauts	1955-1956
O. Hyndman	1955-1974
P. J. Murray	1959-1962
H. Nettling	1959-
I. Wolfer	1961-1962
R. H. Davidson	1962-1966
E. Newton*	1963-1966
A. Cnockaert	1964-1967
G. L. Webb	1964-
H. R. VanParys	1965-
E. J. Douma	1965-1966
L. S. Armstrong	1965-1966
H. J. Marion	1965-1968
C. L. Hyndman	1966-
W. G. Webb	1966-
J. H. Almas	1966-1982
S. Sabo	1967-
M. Norkus	1967-1980
T. C. Docheff	1967-
B. Emre*	1967-1976
L. A. Wezse	1968-
D. Wiedrick	1968-1973
M. K. Williams	1968-
V. T. VanVlierberghe*	1974-1981
H. R. Caughill	1974-1983
D. W. Husul	1977-
M. L. Soen	1979-
J. A. Sobry	1980-
M. L. Saunders	1981-1982
J. R. M. Gubesch	1981-
R. J. Muth	1981-
W. A. Owen	1982-

## Ontario Ministry of Agriculture and Food

## a) Plant Industry Branch

## Extension Officers

M. C. Watson, B.S.A.	1955-
E. W. Presant, M.S.A.	1955-1956
G. E. McCann, M.S.A.	1958-1965
N. W. Sheidow, B.Sc.(Agr.)	1960-
D. B. George, B.Sc.	1965-1968
L. I. Frayne, B.S.A.	1969-1970

## Office and Clerical Staff

M. Dunn	1957-1958
A. Paquette	1958-1961
J. W. Orth	1961-

## b) Ontario Crop Insurance Commission

## Area Manager

F. Goodyear	1975-1977
L. G. Scanlan	1977-

## Office and Clerical Staff

B. Farkas	1975-1978
J. Kuchar	1978-1981
D. Luciani	1981-

## c) Agricultural Energy Centre

## Energy Specialist

M. J. Columbus, B.Sc.(Agr.)	1981-
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## Delhi Engineering Research Group

## Research Engineers

R. Minshall, B.Sc.(Eng.)	1978
J. Dertinger, B.Sc.(Eng.)	1979
D. A. Stier, B.Sc.(Eng.)	1980-

## Engineering Support Staff

C. VanLent*	1978-1980
M. VanLent	1978-1979
J. Antoszek	1978-1979
J. Clapdorp	1979-
L. A. Boyd	1979-
T. Sabo	1979-

\*Deceased







Canada