ANNUAL REPORT OF THE

BEAN IMPROVEMENT COOPERATIVE

A VOLUNTARY AND INFORMAL ORGANIZATION TO EFFECT THE EXCHANGE OF INFORMATION AND MATERIALS

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Report of The

BEAN IMPROVEMENT COOPERATIVE

No. 31 March 1988

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The XXXI Annual Report of the Bean Improvement Cooperative

I am honored and excited by this opportunity to serve as President of the Bean Improvement Cooperative, and look forward to meeting and working with the members. The BIC has enjoyed dynamic and energetic leadership from Bill Frazier, Dermot Coyne and Mike Dickson which has provided national and international interest in our voluntary organization created 31 years ago to exchange information and materials. I and the Coordinating Committee members are dedicated to carrying on the ideals of the BIC and seek your input regarding issues of concern or interest to our organization.

This 31st issue of the BIC is large due to the extensive proceedings of the biennial meeting held in Denver in October of 1987, and the wealth of research papers contributed in 1988. In addition, I was encouraged to add a new section (BIC Invited Paper) that would provide a more extensive review (10 to 20 pages) of a topic of great interest or concern to our membership. Your response to this format is desired; and if you agree with this addition, please provide suggestions for future topics and contributors. At this time the BIC finances are in good standing. I am carefully evaluating publication and mailing costs, and international postage (even surface rates) appear to be higher in addition to domestic rates especially if we continue to publish large volumes such as this one. Therefore we may have to adjust membership rates to more accurately reflect costs, however, I feel that this will be a small sacrifice to continue to obtain the wealth of information and contacts provided by the BIC and its diverse members.

Howard F. Schwartz for the Coordinating Committee

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1989 BIC Meeting in Toronto

The 1989 BIC meeting will be held in The Westbury Hotel, 475 Yonge Street, Toronto, Ontario, Canada M4Y 1X7 during the week of November 5-10, 1989. The National Pea Improvement Association will meet from the evening of November 5 through the morning of November 7, the National Dry Bean Council program is scheduled for the morning of November 7, the BIC program runs from November 7 through the morning of November 9, and W-150 meets in the afternoon of November 9 and the morning of November 10. Meetings of the Phaseolus Crop Advisory Committee and the Pisum Crop Advisory Committee are scheduled for the evening of November 6 and rooms are being held for the evening of November 7 for the Crop Advisory Committee for Special Food Legumes and other groups that may require these facilities. The BIC Awards Dinner will be held on the evening of November 8. The room prices are expected to be $87.00 Canadian (approximately $68 US) but will not be confirmed until 1989. Taxi service from the Lester Pearson airport is $28 Canadian.

The planning committee consists of Dr. Robert Hall and Dr. Greg Boland, Department of Environmental Biology, and Dr. Tom Michoels, Department of Crop Science, University of Guelph, Guelph, Ontario (telephone 519-824-4120). The committee would be pleased to receive ideas regarding the structure and content of the programme.

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MATT J. SILBERNAGEL

Dr. Matt J. Silbernagel, USDA Plant Pathologist, Prosser, Washington is an internationally recognized authority on breeding beans for disease resistance but, in addition, he has contributed very substantially to bean improvement in several other important areas of research. In 1969, he released the 'Apollo' snap bean, the first cultivar resistant to curly top virus (CTV). 'Gold Crop' was released in 1973 carrying resistance to CTV and bean common mosaic virus (BCMV). These same resistances were incorporated into three bean breeding lines released in 1978: 6BP5, 6BP6 and 5BP7; plus 6BP6 demonstrated resistance to BYMV, and 5BP7 was resistant to heat. The breeding line 8BP3, released in 1979, demonstrated resistance to rust, anthracnose, CTV, and BCMV. The 'Blue Mountain' and 'Greenlight' cultivars (1982) were resistant to CTV and BCMV. The 1985 releases were FR266, USDA 711, and CTR Sprite. These beans were resistant to CTV and BCMV, and FR266 was also resistant to Fusarium root rot (FRR) and showed tolerance to white mold. 'VR Romano', with resistance to CTV and BCMV, was released in 1986.

Dr. Silbernagel was a leader in research and development of new rubber belt bean thresher, resulting in less injury to the seed; this improved bean seed quality. He researched the development of beans which produce well under stressful environmental conditions. Dr. Silbernagel was chosen as a consultant to CIAT to help initiate their green bean breeding program, a clear indication of his stature in this scientific endeavor. He is principal investigator of an ongoing Bean/Cowpea CRSP USAID project in Tanzania, and was a member, then Chairman of the Technical Committee of the Bean/Cowpea CRSP Program. He is a member and former Chairman of the Regional Bean Improvement Project W-150.

Dr. Silbernagel was born May 13, 1933 in Hague, North Dakota. He received his B.S. in Botany from the University of Washington in 1957 and his Ph.D. in Plant Pathology from Washington State University in 1961.

RETIREE OF DONALD J. HAGEDORN

Donald J. Hagedorn retired June 30, 1987 from the University of Wisconsin-Madison. Dr. Hagedorn began his graduate studies in 1941 at Madison with Dr. J. C. Walker, completing his Ph.D. degree in 1948. He accepted a position as assistant professor of agronomy and plant pathology until 1964 when he received a full appointment in plant pathology. Dr. Hagedorn is recognized as a world authority of legume viruses and he has written an authoritative monograph on virus diseases of peas. He has been a consultant at the University of Rio Grande do Sul, Brazil, and at the International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India. His research has emphasized plant disease control through the development of disease resistance, resulting in 16 new pea and seven bean breeding lines or cultivars. One of his recent bean breeding lines is resistant to seven pathogens. The germplasm that he has developed has been highly sought after by public and private legume breeders. He has published nearly 300 papers and has supervised 29 Ph.D. students. He has also taught graduate and undergraduate courses in plant pathology.

His honors include AAAS Campbell Award, Ciba-Geigy Award, APS Fellow Award, Honorary Doctor of Science from the University of Idaho, Meritorious Service Awards from the National Pea Improvement Association and the Bean Improvement Cooperative, the Forty-Niner Service Award, and the Wisconsin Academy of Sciences, Arts and Letters Citation. He is continuing his research program on development of disease resistant peas and beans.
# Bean Improvement Meritorious Service Awards

(compiled by H. F. Schwartz)

<table>
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<th>Year</th>
<th>Recipients</th>
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                  William A. Frazier- Oregon State Univ., Horticulturist (BIC Coordinator)  
                  Walter H. Pierce- Asgrow Seed Co., Plant Pathologist  
                  William J. Zaumeyer- USDA, Plant Pathologist |
| 1971 | Walter H. Burkholder- Cornell Univ., Plant Pathologist  
                  James R. Douglass- USDA, Entomologist  
                  Howard S. Gentry- USDA, Plant Explorer  
                  Charles W. Hungerford- Univ. of Idaho, Plant Pathologist  
                  Herbert A. K. Lamprecht- Pl. Breeding Inst. of Sweden, Geneticist  
                  John J. Natti- Cornell Univ., Plant Pathologist  
                  Melbourne C. Parker- Gallatin Valley Seed Co., Plant Breeder  
                  Francis L. Smith- Univ. of California, Agronomist  
                  Robert E. Wester- USDA, Plant Breeder |
| 1973 | Leslie L. Dean- Univ. of Idaho, Plant Pathologist  
                  Dermot P. Coyne- Univ. of Nebraska, Plant Breeder (BIC Coordinator)  
                  Shigemi Honma- Michigan State Univ., Plant Breeder  
                  Max. L. Schuster- Univ. of Nebraska, Plant Pathologist |
| 1977 | Douglas W. Burke- USDA, Plant Pathologist  
                  Roelof Prakken- Utrecht Univ. of the Netherlands, Geneticist  
                  Clibas Vieira- Univ. Federal de Vicosa of Brazil, Agronomist |
| 1979 | Barbara J. Ballantyne- New South Wales, Plant Pathologist  
                  Donald J. Hagedorn- Univ. of Wisconsin, Plant Pathologist  
                  Marshall LeBaron- Univ. of Idaho, Agronomist |
| 1982 | Eelco Drijfhout- Agr. Inst. of the Netherlands, Plant Breeder  
                  Donald H. Wallace- Cornell Univ., Plant Breeder  
                  Donald R. Wood- Colorado State Univ., Plant Breeder |
| 1983 | Leland W. Hudson- USDA, Horticulturist  
                  Roger F. Sandsted- Cornell Univ., Horticulturist |
| 1987 | Michael H. Dickson- Cornell Univ., Plant Breeder (BIC Coordinator)  
                  Aart van Schoonhoven- CIAT, Entomologist  
                  Frederick A. Bliss- Univ. of Wisconsin, Plant Breeder  
                  Matt J. Silbernagel- USDA, Plant Pathologist |
News Items

Dermot P. Coyne, Department of Horticulture, University of Nebraska was successfully nominated by James R. Steadman to receive the 1988 University of Nebraska System-Wide Award for Outstanding Research and Creativity based on his career contributions in bean breeding and genetics. An award plaque and a $2,500 contribution were presented March 28, 1988 at a luncheon hosted by President R. Roskens in Lincoln.

Phaseolus Information Exchange was first published in 1985 to provide scientists an opportunity to report results or reflections arising from their research on problems and developments associated with the genus Phaseolus. Its scope is limited to the areas of genetics, biochemistry and physiology. Those interested in receiving a copy should contact (1) Dr. H. P. Muller, Abt. Biochemische Genetik, Institut fur Genetik, Universitat Bonn, Kirschallee 1, 5300 Bonn 1, Federal Republic of Germany; or (2) Dr. E. Derbyshire, CENA, Universidade de Sao Paulo, 13.400 Piracicaba SP, Caixa Postal 96, Brazil.

Dry Bean Production In Southern Africa is a 35 page progress report from 1986/87 written by R. J. M. Melis and B. D. Carman to improve bean production among black farmers in southern Africa. Contact either author at the following address for more information on this report and their research: Department of Crop Science, University of Natal, 115 Rabie Saunders, Faculty of Agriculture, Carbis Road, Pietermaritzburg 3200, Rep. of South Africa.
Good Morning! Welcome to Denver! I am here to welcome you to Denver and say that Coloradoans hope that you have a pleasant and profitable conference. We are pleased that you came here and know that we will learn from your experiences, your discussions and from your presence.

As a retired professor with considerable seniority, I was selected to deliver this welcome, I expect, because I know many of you personally. I was told to share some personal insights on the history and nature of bean improvement in Colorado, and to keep it short.

Dr. Floyd K. Reed, the agricultural statistician for Colorado asked me in the early 1950's to explain what was happening why the pinto bean crop had increased in yield per acre so significantly on irrigated farms in the state. Yields that were 1000 pounds per acre in 1945 were averaging 1500 per acre in 1950. Pinto yields had been stable for many years--what was going on?

The answer, of course, centered on the introduction of new varieties of pinto beans into the agriculture of the state. The USDA introduced rust resistant ones such as U. S. 1 and U. S. 15 from the breeding program of Dr. William J. Zaumeyer. The competitors were the new Idaho pintos, U. I. 72, U. I. 78, and U. I. 111. All large-seeded, more upright, semi-vine, early maturing types. Which variety should a farmer grow? A few years of extension yield trials and demonstrations with the active cooperation of growers and bean dealers led to the adoption of the Idaho types and U. I. 111 as the standard. These new varieties responded to production practices that increased yield and so they were exploited by Colorado producers. Rust control practices were quickly developed and the old viney varieties were forgotten. Improved yields were the result.
Rust had been a serious problem in the mid 1940's and had devastated the crop more than once. Although the rust resistant USDA varieties were dropped by the farmers in the shakeout, industry leaders felt there should be a major effort to put the rust resistance of the USDA varieties into the Idaho types.

Because it was recognized that other diseases were also important to the bean industry, Dr. L. W. Durrell, plant pathologist with colleagues at the Colorado Agricultural Experiment Station along with industry representatives were able to induce the Colorado Legislature to put a line item into the station budget for a bean improvement program. It would be interdisciplinary and would include Plant Pathology, Entomology, and Agronomy and the relevant branch experiment stations. Principal leader was Dr. W. D. Thomas, a plant pathologist. I succeeded R. D. Ensign as the agronomy assistant on the project in 1949.

My previous plant breeding experience, limited as it was, was with barley and alfalfa, but I made a few difficult crosses with the Idaho varieties and rust resistant parents. Thankfully, I soon met Dr. Bill Zaumeyer and Dr. H. Rex Thomas of the USDA who had plenty of these kind of crosses but wanted an agronomist plant breeder to assist, or at least plant their nurseries at the U. S. Potato Station at Greeley, Colorado.

All of a sudden Colorado was a partner in a real pinto breeding program. We inherited the entire thing when the USDA closed their program at Greeley in the mid 1950's.

As a result of this activity, with continuing support of growers, bean dealers, and complementary research support in plant pathology, entomology, soil science and extension Colorado pinto bean yields are still going up on irrigated land. In 1970 they averaged 1700 pounds per acre and in 1985 they were 1980 pounds per acre. It may be a ton per acre now.

One field day at the Yellow Jacket Experiment Station, a grower interrupted my talk with a question, "What is wrong with the beans in the San Juan Basin? We used to get 10 or 15 sacks. Now we are lucky to get five! Why doesn't CSU do more work on beans here in the basin?" Any one who has operated an agricultural research project in Colorado has to answer that last question first. A single trip of a few days from Ft.
Collins to Cortez would stretch the research budget to the limit and research activity beyond routine variety testing would court financial disaster.

Pintos are important in the Four Corners Region, however, soil and climate conspire to make beans the only good cash crop available. Farmers in this area wanted real help, not excuses.

"What if we took up a collection to pay for some travel and some graduate students to help? Could you do it then?", one farmer asked. So, a second pinto bean breeding program for Colorado began. Loren Alexander, County Agent in Dolores County, took charge of the money raising and we all went to work. We were breeding for plant vigor and yield under root rot and drought stress conditions. We were following the lead of Dr. Doug Burke at Prosser, Washington. Dryland yields have been steady at 350 pounds per acre for over 40 years. Recently we released the new variety Cahone, which should provide a fifteen percent increase in yield for that region, future statistics will tell the story. And more new and better varieties are coming.

My last story is about a trip I made to Tanzania. Our U. S. team was waiting for a conference with the Director of Research of the Ministry of Agriculture. Our goal was to develop a research and extension program for crop production on areas of marginal rainfall. Everyone was waiting. Where was the director? Still on the telephone trying to deal with a new crisis. It was how to keep rats, who had increased unexpectedly in numbers, from digging up and eating the newly planted seed corn. Where does one find the answer? It suddenly dawned on me that a county agent in Colorado has more resources available to solve agricultural problems than are available to the Minister of Agriculture in most third world countries.

Infrastructural support for agriculture is vital. It means support technology for production, marketing, and utilization. It includes all kinds of expertise that provides support for agriculture and includes the ability of the farmer to read and understand. The answer is a team effort, skilled and informed farmers supported by trained technicians who can supply the proper machine, the best seed, an accurate soil test, correct analysis of a plant disease or insect problem, timely management data, and support at the marketing and financing level. All of these technologies
are necessary for a successful agriculture. All of those increases were not due to new bean varieties!

Now that I have told you my stories, I want to tell you why it is such a pleasure to welcome you. I can explain how important I think you and your activities are to this country by telling you what I wrote to my father when he asked me to comment on the October 19 stock market crash. I said, I agree that some of the problem is due to the debts that the government is running up and the huge trade deficits that are piling up. I also think that some of the machine trading strategies promote excess speculation and a casino atmosphere that contributed to the crash. But I feel that there is a fundamental problem behind the trade deficit that is basic in our society. We have to provide the world things that they are willing to buy.

We used to sell airplanes, cars, electronic instruments, movies and agricultural products all over the world. We were the world headquarters for these things. However, with new facilities and new technology, the world is now selling to us, growing their own grain and buying very few things from us. This is where you come in. We need to continue to be innovative and creative in our society. We need to work to develop new skills, new products that people need and that will sell abroad. And we should continue to be innovative here at home.

We certainly continue to need an efficient agriculture to produce our food and fiber. Agriculture has long known that the key to innovation and efficiency is a strong infrastructure of supporting technology. Technology amplifies our labor and skill and provides us leverage in getting an appropriate return for our work. If our farmers produced beans using the same level of technology that farmers use in the third world, they too would have to live on ninety dollars a year. Yes, you folks make a difference.
REPORT OF THE GENETICS COMMITTEE

At the latest Bean Improvement Cooperative meeting in Denver it was decided by a number of interested individuals to revive the Genetics committee of the B.I.C. This is a report on the orientations the committee will pursue:

1. Membership: The committee is currently integrated by Mark Bassett, Paul Gepts, Jim Myers, Eduardo Vallejos, and Norm Weeden, for the U.S.; S. Singh for CIAT and South America; and C. Leakey and H.P. Mueller for Europe.

2. Objectives:
   2.1. Gene list: M. Bassett will establish an updated gene list for common bean; this list will be maintained on computer to facilitate update, distribution, and regular publication. The updated version of this gene list will be published in next year's issue of the Annual Report of B.I.C.
   2.2. Rules of genetic analysis and nomenclature: J. Myers and N. Weeden have drafted rules of genetic analysis and nomenclature for genes coding for morphological traits, isozymes, seed proteins, and RFLPs. These rules are published in this issue of the B.I.C. Annual Report. The widely adapted Colombian cultivar 'ICA-Pijao' will provide the standard isozyme alleles. Limited amounts of seeds of 'ICA-Pijao' are available from Paul Gepts (see address below).
   2.3. Genetic stocks:
      a) P. Gepts will construct two lines which have either all F or all S isozyme alleles in order to facilitate future mapping.
      b) The committee will attempt to establish a collection of genetic stocks which will include primarily morphological markers, isozyme, seed proteins and RFLPs. A request has been made to establish duplicate collections both at Pullman and at CIAT. S. Singh has agreed to act as curator of the stock collection at CIAT.
   2.4. Mapping of the common bean genome:
      Three programs are currently engaged in linkage studies: N. Weeden, E. Vallejos, and P. Gepts. It was felt that it is too early to start exchanging plant materials or probes; however, we have agreed on running a common set of isozymes and establishing linkages with these isozyme loci in order to be able to compare our results.

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The Phaseolus Crop Advisory Committee met for the eighth time on October 26, 1987, in conjunction with the BIC and W-150 meetings in Denver, CO. Those present were R. Klein, M. Bassett, M. Silbernagel, R. Stavely, G. Varner, J. Kelly, E. Roos, S. Eberhart, A. Stoner, J. Myers, G. Freytag, D. Webster (Chairman), G. Hosfield, H. Schwartz, M. Dickson, and R. Hannan.

Important agenda items discussed were:

1. Report by R. Stavely on the screening of the USDA Phaseolus germplasm collection to bean rust. Several lines screened were identified as having good resistance, and some exhibited slow rusting or intermediate resistance.

2. Report by Klein and Hannan on the progress of cleaning the USDA Phaseolus collection of seedborne BCMV. A system of screening, using seed flour and ELISA testing, has been worked out.

3. Report by M. Silbernagel on screening bean germplasm for root-rot resistance. He has found lines with both Fusarium root-rot and *Pythium aphanomyces* resistance.

4. Discussion of evaluation projects. The above three projects were funded from germplasm evaluation monies. The PCAC recommended that the proposals for this work be resubmitted and that the work continue in 1988. Progress will be reevaluated at the 1989 PCAC meeting.

5. Report by G. Freytag of bean germplasm collection trip to southwestern Mexico. This trip was made by Russ Buhrow of Univ. of Arizona. The trip was successful mostly in terms of gaining valuable information on sites where *Phaseolus* species can be found.

6. Dr. S. Eberhart of the National Seed Storage Laboratory explained the new proposed operations policy with regard to amounts of germplasm to be stored at NSSL. He also wanted recommendations on which old or heirloom varieties should be assigned PI numbers.

7. Dr. A. Stoner gave a brief explanation of the structure and function of the NPGS and illuminated the role of the Crop Advisory Committees.

8. The by-laws were amended to increase the chairmanship term to three years. New members elected were G. Hosfield, J. Kelly, and S. Magnuson. Jim Kelly was elected as the new secretary.

7. The next PCAC meeting will be held in Jan. 1989 in Puerto Rico.
Request for plant materials

I am interested in studying the genetics of trait instabilities in common bean. These instabilities can affect different organs of the plant and can therefore take on different forms. The most conspicuous instabilities are those involving flower pigmentation (e.g., purple or pink sectors on white background) or chlorophyll variegation. Other traits of the plants may be affected too. In general, these instabilities obey one or more of the following rules: 1) simple Mendelian ratio when crossed with stable lines; 2) trait change from recessive state to dominant state; occasional back-reversion from dominant to recessive state; 3) additional instabilities affecting different traits in the same genotype; 4) generation of new variants of the unstable trait; 5) in certain cases, a high frequency of instability: 10^{-2} to 10^{-4}.

If you are aware of any such material or have any seeds you could send me, I would really appreciate it. My address is:

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Thank you in advance.
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A. Balance on Hand March 6, 1987 $2420.13

Income
   Dues collected and sale of back issues $762.00

Expenses
   Postmaster, including shipment of BIC reports/records to H. F. Schwartz $677.28
   Printing 579.76
   BIC Award Dinner Printing 79.21
   Frame Shop 82.39
   Secretarial Services 370.00
   BIC Committee Breakfast 61.00
   Advance for Annual Meeting 200.00

Balance on Hand December 23, 1987 $1132.49

B. Balance Transferred to H. F. Schwartz $1132.49

Annual Meeting - Advance Reimbursement $1348.83
and Agribusiness Donations

Income
   Dues collected and sale of back issues $1776.50
   Bank account interest earned 46.10

Expenses
   Postage $262.70
   Office Supplies 81.37
   Secretarial Services 130.50
   Printing 13.22

Balance on Hand March 31, 1988 $3816.13

* The Denver BIC Organizing Committee (Schwartz, Brick, Roos) gratefully acknowledge contributions towards the annual meeting expenses and proceedings costs from the Colorado Dry Bean Advisory Board, National Dry Bean Council, Rocky Mountain Bean Dealers Association, Jacks Bean Co., Eli Lilly & Co., Fermenta Plant Protection, and ICI Americas Inc.