SEEDS FOR RECLAMATION

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Grassland Philosophy

The contribution of good grasslands to soil conservation should not be minimized. A plant community that forms a closed canopy is probably the best deterrent to soil erosion that man can devise. Well nodulated legumes contribute substantial amounts of N to the system, while grasses are thought to contribute much less. However, it has been shown that free-living, N-fixing bacteria accumulate atmospheric N at a considerable rate in a grass community, especially under humid, tropical conditions.

A grassland plant community protects the soil from wind and water erosion, adds some N to the system, and also improves soil structure and tilth. This improved soil condition is the result of interactions of living and dead plant roots, micro-organisms, and soil. When grassland agriculture is practiced intensively, organic matter is renewed, soil erosion prevented, gully formation arrested, and soil tilth improved; therefore, soil conservation becomes an opportunity instead of a problem. Grass, when properly used, counters the devastating influence of erosion.

Grassland improvement has an essential role to plan in increased agricultural production. We are a meat-eating and milk-drinking nation, and grasslands provide the major raw material for production of beef and dairy products on land that cannot be used under intensive cultivation and in areas too far north for corn and bean production.

Due to increased world population, humans are competing with livestock for feed grains. The pressure of people on the world's food supply is a powerful force. The pressure of housing and cities on the good lands in North America will result in less productive land being pressed into production. The cities apparently will expand on all land close to cities because cities generate jobs and opportunities, and governments are forced to provide houses close to factories. The growth of cities is an amoeba-like system that slowly but surely expands. This factor will result in poorer soils being used for food production, and food production will probably have to come from land that we now consider to be too poor to farm. This increased production must come as a result of forages being fed to livestock. It would appear that the days of high grain ration being fed to ruminants is gone.

A sound, national grassland philosophy must be developed before grassland agriculture will be practiced generally on individual farms. I realize that most people at this workshop may not be agriculturalists, but I also feel that your ultimate goal should be to produce roughage that can be used to produce food products. The fact that the reclaimed land can be used in food production will do many things, such as appease public opinion in the short term and, in the long term, may well supply food for the world community.

Soil and climate, together with factors governing production and utilization of grasses and legumes, determine the intensity of grassland agriculture in different parts of the country.

Grassland and agriculture is a long-term program directed toward increased production from improved grasslands and more efficient use of high quality forage, rich in protein, minerals, etc. I would suggest that the use of recognized agricultural species is best,because seed supplies are much more reliable since there is a system in place in Canada to provide quality seed for agricultural production. This system is operated by the organization called The Canadian Seed Growers' Association, in conjunction with the federal government and the pedigreed seed committees in each province.

What is The Canadian Seed Growers' Association?

The Canadian Seed Growers' Association is the sole agency in Canada for pedigreeing all seed crops except potatoes and tree seeds.

The regulations and procedures for the production of pedigreed seed crops are established by committees of the Association, composed of plant breeders, research scientists, regulatory officials, seed growers, and the seed trade. Membership is open to any person, partnership. or organization wishing to produce pedigreed seed.

The affairs of the Association are conducted by a President and a Board of Directors elected by the general membership. Nine members of the Board of Directors are nominated by provincial ministers of agriculture and eleven members are nominated by active growers. The President is an active seed grower.

The Association was formed in 1904 under the sponsorship of the Canada Department of Agriculture. It has continued to cooperate with the Department, almost as a partner, to achieve its unique function. In 1923, the first non-government employee was installed as Secretary. In 1925, the office of President was filled by someone other than a federal government officer. The Association cooperates closely with all plant breeders, provincial governments, and agricultural facilities of the universities throughout the country.

The Association is a non-profit organization and is largely self-supporting; however, the Canada Department of Agriculture assists the Association financially if and when the acreage of pedigreed production falls below a specified level.

Genetic Purity

Pedigreeing of seed is designed primarily to maintain genetic purity. This is particularly important for present-day varieties that have specific factors for disease resistance and yield performance under difficult soil and climatic conditions. Along with maintaining pedigree records and establishing standards for seed production, The Canadian Seed Growers' Association encourages the development and production of superior varieties and strains, provides for the multiplication and dissemination of propagated stocks. It also plays a major role in encouraging both domestic and foreign use of pedigreed seed of superior varieties by cooperating with other agencies and governments in market development programs.

Field inspection of pedigreed seed crops is carried out by officials of the Canada Department of Agriculture. The decision to grant pedigreed status and the issuing of Crop Certificates is done by the C.S.G.A. This feature provides the necessary safeguards for an impartial appraisal of each field inspected that is recognized throughout the world.

Forage crops are normally pedigreed through three classes -- Breeder, Foundation, and Certified. All perennial crops have age-of-stand limitations which vary with the species, stating the number of years an established crop may produce a pedigreed seed crop. (Figure 1)

Why use Pedigreed Seed?

1. Genetically pure as to variety.
2. Seed with superior mechanical purity and germination.
3. Government-graded and inspected.
4. Seed produced specifically for seeding purposes.
5. Seed with proven performance.

Seed-quality standards for Pedigreed Seed are established by the Canada Seeds Act and Regulations. Before Pedigreed Seed can be sold, it must be graded in accordance with these standards and be sealed with the official tags and seals as prescribed by the above Act.

Variety Evaluation and Licensing System

A public or private plant breeder will enter his variety of any crop species into the evaluation system which is in place in all provinces. The evaluation system varies between provinces but, essentially, all federal and provincial departments and universities involved in plant breeding are included. The system involves the evaluation of variety characteristics, such as yield and disease reaction, etc., against recognized check varieties. The data accumulated in these trials is presented to Provincial Committees who assess the data and recommend that the variety under test should be re-tested, discarded, or licensed. The data, along with the provincial recommendation, is submitted to the Plant Products Division of Canada Department of Agriculture.

The data and recommendation are again assessed and, normally, the variety is licensed. When the variety is licensed, the Breeder will contact the Canadian Seed Growers' Association or the Provincial Seed Committee and request multiplication of the seed. The members of the C.S.G.A. will multiply the variety under guidelines, and the fields and seed are all inspected by Plant Products Division Inspectors. The seed is then tagged with C.S.G.A. tags and offered for sale.

This system may appear to be very cumbersome but, in actual fact, it works very well. The seed offered for sale under this system is highly respected in many parts of the world.

Selection of Species

The selection of forage or ground cover species is a decision that must be made based on a host of variables. The choice involves seed availability, soil, and climate conditions. Factors such as soil drainage, pH, persistence (winter hardiness) required, and primary use will nearly always be the principal criteria in selecting the species.

Let us look at some of the problems encountered in the establishment of a crop.

Drainage: In many cases, soil drainage will be the most critical factor, especially on areas where poor natural drainage prevails. In this case, a birdsfoot trefoil mixture would give higher yield than a mixture of alfalfa and orchard grass. Red clover is better adapted to poor drainage than alfalfa. On wet soils, alsike clover is often included with red clover to improve the stand in lower areas. Grass species, except for orchard grass, are tolerant to poor drainage. In excessively wet areas such as undrained bottom land, reed canary grass is well adapted. Tile drains or good surface drainage will be needed to maintain legumes, including birdsfoot trefoil.

Soil Acidity: At lower pH, soil reaction becomes important in alfalfa and, especially, sweet clover production. With these species, liming usually pays if the pH is 6.0 or lower. If the pH is substantially below this level, either lime the area or choose a more acid-tolerant legume. With other legumes, such as trefoil and alsike, which show less response to liming, the cost of liming is seldom warranted. Grasses do not normally show any significant yield response to pH changes.

Persistence: Once a perennial forage is established, good management in terms of fertility and weed control will help to ensure a long-lasting quality stand.

Mixtures: The greater the number of species in a mixture, the greater the opportunity for competition among species, which results in the dominance of the most competitive species and failure of the weaker ones.

Summary

1. Land that has been reclaimed will ultimately be used for food production.

2. Species used to reclaim land should be recognized agricultural species because good seed is always available for agricultural species.

3. Seed produced under the direction of C.S.G.A. and C.D.A. will be:

   - more true to variety,
   - more free of weed seeds,
   - more predictable.

4. The variety breeding,evaluation,licensing, production and recommendation systems are well established in Canada.

5. Species and variety selection is very important and must be accomplished after all variables have been considered.

PEDIGREED GRASS SEED PRODUCTION

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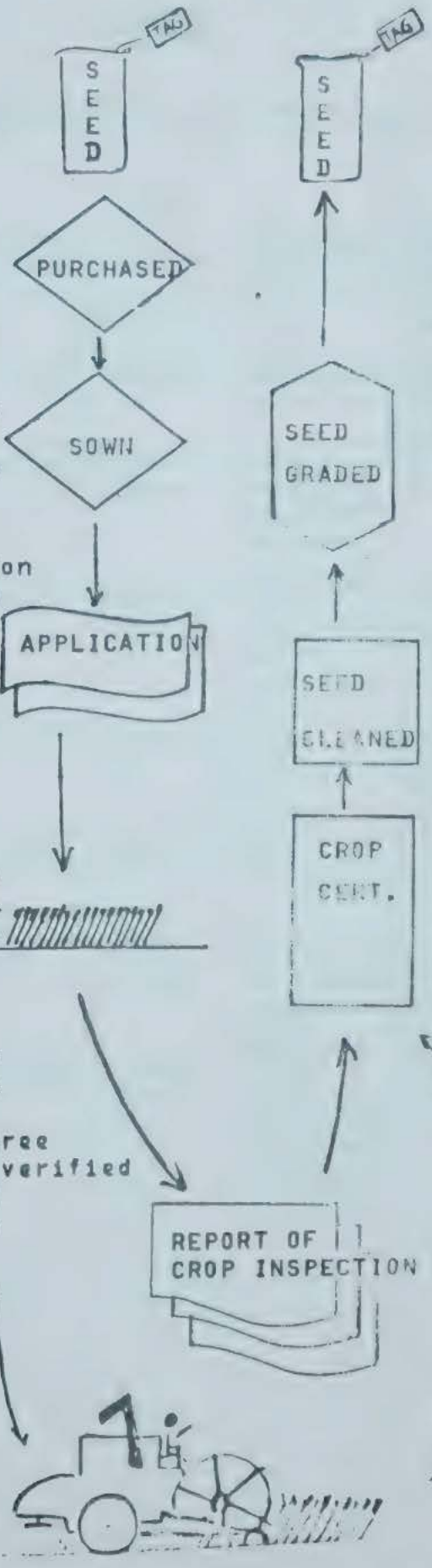

Tagged and sealed Pedigreed seed is guaranteed
-varietal purity
-quality seed
-high germination
-high degree of freedom from weed seeds and undesirable seed of other crops.
Pedigreed seed is purchased for the production of better crops

Seed is inspected, graded and sealed to Canada Seeds Act requirements by the Plant Products Div.

Seed is cleaned by the grower or a seed processing company

The Crop Certificate issued by the CSGA permits seed from the inspected crop to be offered for sealing as a class of pedigreed seed

Crop is harvested with clean equipment and stored in clean bins until seed is processed

APPENDIX 1

TABLE OF VARIOUS SPECIES & CHARACTERISTICS *(THAT MAY BE USED TO SELECT AN ADAPTABLE CROP)*

ECIES	pH RANGE FOR OPTIMUM GROWTH	REQUIRED DRAINAGE	PERSISTENCE	PRIMARY USE	ADVANTAGES	CAUTION AREAS	CULTURAL NOTES	VARIETIES
alfa	6.5-8.0	Excellent	2-4 years	Stored forage	High yield	Bloat; Poor persistence	Livestock feed	Iroquois Vernal
foil	5.5-7.5	Poor to excellent	Long term	Pasture	Excellent persistence	Difficult to establish	Livestock feed and cover crop	Leo Empire
ver	6.0-7.5	Moderately poor to excellent	1-3 years	Stored forage	Easy to establish; Tolerates wet and acid soil	Short lived	Livestock feed	Ottawa Dollard
ike ver	5.5-7.5	Poor to excellent	2-3 years	Stored forage	Tolerant to poor drainage and quite acid soil	Lack of persistence; Will reseed itself	Drainage tolerant	Aurora Dawn
te ver ld te)	6.0-7.5	Moderately good to excellent	Long term	Pasture	Self-maintaining	Lack of yield; Dries up in summer	Wild in many areas	Common
te ver dino)	6.0-7.5	Moderately good to excellent	1-2 years	Pasture	Fast regrowth	Lack of persistence; Required moisture	Quick regrowth	Merit
t er	6.5-8.0	Moderately poor	2 years	Green manure	Excellent soil builder; Opens up soil's oil	Low palatability	Usually seeded alone	Polara Yukon
wn ch	6 or above	Well drained soil	Excellent	Ground cover	Ground cover in mine spoil areas and highways	Establishment problems	Poor seed production	Penngift

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TABLE OF VARIOUS SPECIES & CHARACTERISTICS *(THAT MAY BE USED TO SELECT AN ADAPTABLE CROP)*

CIES	pH RANGE FOR OPTIMUM GROWTH	REQUIRED DRAINAGE	PERSISTENCE	PRIMARY USE	ADVANTAGES	CAUTION AREAS	CULTURAL NOTES	VARIETIES
me	Not pH sensitive	Moderately poor to excellent	Excellent	Stored feed	Early spring growth	Difficult to establish	Responds well to N	Baylor Saratoga
othy	Not pH sensitive	Poor to excellent	Excellent	Stored feed	Easy to establish	Slow recovery after cutting	Responds to N	Champ Itasca
d ry	Not pH sensitive	Very poor to excellent	Excellent	Low land	Does well under poor and on dry land	Heavy growth	Responds to high fertility	Frontier Rise
hard ss	Not pH sensitive	Moderately good to excellent	Good	Stored feed	Drought resistant	Less winter hardy than other grasses	Responds well to N	Hallmark Kay
sted at ses	Does not tolerate alkali soils	Good to excellent	Excellent	Reseeding of range-land	Wind and water erosion; Drought resistant	Will not persist on flooded areas	Adapted to Western Canada	Summit Nordan
egrass ada	Not pH sensitive	Fair to well drained	Excellent	Ground cover	Drought resistant; Goes dormant	Needs open area	Responds to irrigation and N	Canon
op	Grows on very acid soil	Poor	Excellent	Ground cover	Low fertility	Will not live in very dry areas	Creeping and upright	Common
dow cues	Not pH sensitive	Poor to excellent	Excellent	Pasture	Good on wet land	Susceptible to leaf rust	Responds to fertilizer	Ensign Trader
eping cues	Not pH sensitive	Poor to excellent	Excellent	Turf and soil con-servation	Useful on dry, sandy and shady areas	Strains vary in spreading habit	Spreads by rhizomes and seed	Boreal
grass ennial	Not pH sensitive	Moderately good to excellent	3-4 years	Soil con-servation and turf	Rapid seedling growth	Low temp-erature; Drought; Poor fertility	Responds to high fertility	Norlea

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FORMERLY
PROCEEDINGS OF
THE ONTARIO COVER CROP COMMITTEE

PROCEEDINGS OF THE INAUGURAL MEETING
OF THE
CANADIAN LAND RECLAMATION ASSOCIATION

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