ALASKA GRAIN EXCHANGE, INC.

The Alaska Grain Exchange is an agricultural marketing cooperative formed to provide access for the farmers to established marketing channels. Also, the Grain Exchange would actively promote and foster the development of agriculture in the state.

Marketing pools would be established for specific commodities. Access to established marketing channels would be accomplished by the operation, control and management of the proposed export facilities and other related facilities.

Membership in the cooperative will be limited to producing farmers. Voting in the cooperative will be based on patronage. Initial requirements for voting membership will be the production of at least fifty acres of grain in the last two years (1979-1980). Any producer can market any quantity of product through the organization.

The cooperative will be controlled by a five member board selected from the producer members of the organization. An interim board has been selected by an appointed nominating committee. The board will have five major committees. These are: 1) Funding; 2) Legislative; 3) Legal; 4) Marketing and Export, and 5) Public Relations.

Initial funding for the organization will be from the producer membership. Private enterprise will be solicited to be supporting contributors. These contributors will be known as Associate Members. They will be in three categories known as Personal, Corporate and Sustaining memberships.

One of the purposes of the money raised will be to prove valid producer interest in the organization. The money will be used to provide for general office and other original costs. We will also mount a lobbying effort to promote the legislation that will be beneficial to the organization. We propose to hire the expertise necessary to implement and coordinate the programs.

Management of the pool will be critical to its success. It will be responsible for: 1) organization and operation of the pool; 2) provide the mechanism to move the commodities from farm to the market; 3) manage the export facility; 4) education of producers and consumers; 5) membership promotion, and 6) coordinate and implement lobbying efforts.

AGRICULTURAL LOAN FUND SUMMARY

The Agricultural Revolving Loan Fund (ARLF) is the primary source of low interest loans for farm development and operation of the associated processing facilities. The fund was established, in accordance with legislative and administrative policy, to allow the reinvestment of income from non-renewable resources into the renewable resource of agriculture. The fund has grown, since 1953, to a total capitalization of over $20 million with the bulk of this capital ($16 million) having been added as a part of the State's large scale development program which began in 1978 (see the attached summary of the progression of added capital).

Loans from the ARLF are made to farms of all sizes, in all areas of the State. The amounts loaned range from less than $10 thousand to amounts in excess of $1 million with the greatest number of borrowers falling in the under-$50 thousand category. The total of loans made per farm is as follows:

Range	Number of Borrowers	Total Amount Loaned	Average Indebtedness of Borrower
Under $50,000	118	$ 2,193,807	$ 11,699
50,001 to 100,000	23	1,760,625	76,548
100,001 to 150,000	13	1,586,321	122,024
150,001 to 250,000	10	1,971,728	351,126
500,001 to 1,000,000	6	4,640,171	773,362
1,000,001 and over	3	5,555,000	$1,851,666
Total	189	$ 23,325,670	

160 farms received loans totalling less than $200,000 per farm with the average loan being $41,181 per farm. Of this 160, 141 farms borrowed less than $100,000 each for an average of $28,045 per farm.

The appropriated amounts currently outstanding, by area of the State, are as follows:

Area	Number of Borrowers	Number of Loans	Amount
Matanuska	70	137	7,457,130
Tanana	90	230	11,586,425
Kenai	26	40	978,140
Other	6	14	697,509
Total	192	421	20,719,204
Special loans administered by ARLF		2	1,134,451
Totals		423	$21,853,655

The amount totals vary between the two charts in that the first chart reflects total loans made and the second chart reflects loan balances as they currently exist. The difference in the number of borrowers is caused by several individuals having loans in more than one area.

Through December 1980, the Fiscal 80 appropriations of $12,960,000 were loaned as follows:

Loan Range	Number of Loans	Amount
1,000 - 5,000	19	$ 65,300
5,100 - 15,000	63	639,475
15,100 - 25,000	31	670,770
25,100 - 50,000	30	1,093,750
50,100 - 100,000	26	2,035,550
100,100 - 150,000	13	1,786,000
150,100 - 300,000	9	2,114,515
300,100 - 500,000	1	500,000
Over 500,000	3	2,283,033
Totals	195	$ 11,288,393

As the State's development program proceeds, the ARLF will continue to play a primary role in financing developing areas, farms and processors. This role is required by the reluctance of other financing institutions to invest in an industry with no proven track record. Our agricultural industry is too new to have developed that track record, and, as an industry, is still incomplete. It is estimated that a developmental period of from five to ten years will be required before any substantial trend toward alternative financing sources can take place.

One the industry has become established and has developed the needed performance record, the move to alternative financing sources can begin. In the long run, it is not in the best interest of the farm community for the industry to be based on the concept of continued low interest loans from a single governmental source. Very soon the ARLF must undergo structural and procedural changes which will ease these farm-related borrowers from reliance on the fund and into the market for other types of financing. A decreasing role for the ARLF is projected after the initial five year development phase of each new enterprise and farm area.

The Division of Agriculture's FY 82 budget request as approved by the Governor adds $23 million to the capitalized size of the fund. This amount will fund the planned agricultural development needs for the next year as outlined in the Department's overall agricultural development schedule. In addition to this increase in capitalization of the fund, the statutory fund size limit will have to be changed. We have recommended an increase to $200,000,000, which will eliminate the need for annual fund size increases over the next three years, as additional capital is needed.

It would also be advisable to increase the maximum allowable loan size per farm. At the present time, the limit of $500,000 per farm for farm development loans is often restrictive. A dairy, beef, or pork production unit will normally see a required investment of $1,000,000 per farm. The allowable amounts for operating capital and chattel (equipment or livestock) are also restrictive for large, economic size units producing these products.

Through use of the Department of Revenue's willingness to purchase proven loans from the fund, it will not be necessary for a supplemental appropriation to provide operating funds for already financed farms this spring. However, at this time there are no funds available to finance new operations until additional capitalization is added.

FISCAL SUMMARY OF LOAN FUND

YEAR	APPROPRIATION	TOTAL FUND SIZE	STATUTORY AUTHORIZATION AND CHANGES
1953	$200,000	$ 200,000	Fund created; authorized up to $1,000,000 short-term loans not to exceed $2,000 on 1-year terms at 6%; chattel loans not to exceed $10,000 for 5-year terms at 5%; farm development loans not to exceed $15,000 with up to 20 years at 4.5%.
1955	150,000	150,000	Farm development limit raised to $20,000 maximum.
1957	125,000	125,000	
1959	100,000	100,000	
1960	75,000	75,000	
1961	200,000	200,000	Authorized Fund increased to $2,000,000; short-term limit $5,000; chattel limit $25,000; farm development to $40,000.
1962	200,000	200,000	
1964			Authorized to utilize TR and PER Funds
1966	45,000	45,000	Short-term limit raised to $10,000; chattel limit increased to $40,000 for 7 years at 6%; farm development limit raised to $50,000 for 30 years at 5%.
1967	45,000	45,000	Short-term limit raised to $15,000; farm development limit raised to $75,000 and 6%.
1968	300,000	300,000	
1969	100,000	$1,540,000	
1970	500,000	500,000	Special irrigation fund established with up to 20 years at 4%; chattel limits raised to $100,000; farm development limits raised to $150,000; authority to sell loans to Department of Revenue.
	800,000	800,000	Fund limits raised to $5,000,000
1971	200,000	3,040,000	
1974 FY75	200,000	3,240,000	Additional appropriation. Short-term loan limits raised to $25,000
1975 FY76	200,000	3,440,000	

FISCAL SUMMARY OF LOAN FUND

YEAR	APPROPRIATION	TOTAL FUND SIZE	STATUTORY AUTHORIZATION AND CHANGES
1976 FY77	$ 200,000	33,440,000	
1977 FY78	400,000	4,040,000	
1978 FY79	200,000	4,240,000	
1979	4,000,000	4,000,000	
FY80	(1,200,000)		Taken for fire fighting
	2,800,000	7,040,000	
1980 4/80	6,800,000	6,800,000	
1981	6,160,000	6,160,000	
	20,000,000	20,000,000	

Alaska State Legislature

House of Representatives

Committee on Resources

Terry Gardiner, Co-Chairman
Fred F. Zharoff, Co-Chairman
465-3715

Pouch V
State Capitol
Juneau, Alaska 99811

To: House Resource Committee Members

From: Co-Chairmen Gardiner & Zharoff

Date: April 20, 1981

Re: Agriculture Info/Testimony

Attached is information and written testimony forwarded to the Resources Committee pertaining to Agriculture. Those submitting this information requested that it be forwarded to committee members.

Mr. Chairman-- My name is Gene Whiting. I have Little Goldstream Associates, the company that did the vegetable study for the Nenana-Totchaket area. Previous to that I was employed for several years at the Agricultural Experiment Station in Fairbanks. I believe a summary of some of our findings in the vegetable study will be of benefit in defining the small scale farm potential in Alaska.

First, I would like to put the report in context. In the study, we are negative toward an in-State potato or vegetable processing plant. This should not be construed to mean that vegetable growing or even processing cannot be profitable in Alaska. In the contract, we were under the constraint of developing a vegetable industry from scratch in a wilderness situation. By using two-thirds of the total railbelt market as a market share, we simply cannot show a processing plant generating a profit by the year 1990. There is also the problem of being able to cover the farmers' cost of production. Vegetables sold to processors command only about one-half the price of vegetables wholesaled to the fresh market. When the cost of financing a complete new farm is added to the variable costs of production, this "processing price" would not provide a family with a livable income.

On Tuesday, Wayne Littleton of the Alaska Renewable Resources

Corporation gave testimony indicating they are considering funding a food processor with potatoes as a secondary product. Our report in no way relates to the feasibility of this endeavor. In fact, this is an excellent example of what may work.

The problem with vegetable production in Alaska, as with other phases of agriculture, is the small market. Based on our survey, to supply all the available fresh vegetable market in the railbelt would require an additional 1,683 acres in production by 1990. Subtracting potatoes leaves 345 acres in other vegetables. This is for the fresh market only. If a freezing plant is established for potatoes and other vegetables, it would triple the acres required to 5,337.

It is apparent from these figures that enough land already exists in private hands, or is being made available through the smaller agricultural disposals to supply Alaska's vegetable needs. In addition, there exist interested residents ready and willing to take up the task.

Why then, you may ask, is there not more small agriculture production in the state? For one thing, the present emphasis on agriculture and subsequent availability of land is a recent development. There are also, I believe, very real institutional roadblocks for the small producer. Last summer at a public hearing in Nenana before

the Alaska Agriculture Council I made the comment that the State seems to be passing by the day-to-day opportunities in favor of large projects. I was immediately trounced on by several members of the Council, perhaps rightly so. However, as indicated on Tuesday, by Mr. Ward of the Kenai Stockgrowers Association, this perception of the situation exists throughout the State.

To help alleviate this situation, I have a list of four specific positive measures that can be initiated through existing agencies or pending legislation for a minimal cost. While my recommendations are geared to the Interior, many will apply to the State as a whole.

1. Boost the Agricultural Revolving Fund and earmark these funds for the little guys. One of the problems in administering this Fund is that it is designed to--quote--"promote the more rapid development of agriculture as an industry." Much therefore, depends on one's interpretation of "agriculture as an industry." It is my belief that the person on a small tract that wishes to clear two to forty acres to supplement his income is every bit as important, and has just as much right to these agricultural funds as a grain farmer from Montana. We must face the reality that to jump in and instantly make a full time living at vegetable farming in Alaska simply is not in the cards. Vegetable farming <u>is</u> evolving in the State slowly, and these people--the serious part-timers--are a natural step in this evolution.

2. Representative Moss has introduced HB 38 pertaining to land clearing on small tracts. This is an excellent example of the type of legislation that will affect many people at a reasonable cost. One thousand people can clear ten acres each for less cost than the State has projected for financing one cow-calf operation.

3. Give the Division of Agriculture sufficient funds to staff the office in Fairbanks. The people in the Fairbanks area need a Division of Agriculture representative who is familiar with the loan funds and division policy. In simple terms, we need a friend we can sit down and talk to.

4. Last, but probably most important, there should be a procedure by which residents can propose and acquire adjacent land. The current system of agricultural lotteries is fine for a person moving into the area, but most of the people affected by small scale agriculture are already rural residents. If they do wish to expand agriculturally, they must investigate and propose land adjacent to their property. If the land proposed for disposal is put in a lottery, the resident who nominated it has little chance of acquiring it. If the land is sold under the rules of an auction sale, which allow preference rights, the price is usually too high for agricultural use. This "catch-22" of land disposal is a great stumbling block to natural evolution of agriculture in Alaska.

I would like to point out that I am not in favor of small farms at the expense of large farms. The long-term profitability of these grain operations seems evident. Local problems are arising in Delta due to the accelerated development schedule, but I am a firm believer in the over-all concept of grain farming in the Interior. In addition to the very large and the very small, there are opportunities in moderate scale operations. Hay, potatoes, local specialty grain operations are all feasible ideas.

In closing, I would like to mention the large cow-calf operations that have been discussed this week. As what I know about livestock would fit in a teacup, I will not comment on their feasibility. It seems apparent, however, that most of these operations will go to nonresidents. It is doubtful that there are many people in Alaska with the combination of experience and financial resources to establish a $2.5 million ranch. As a citizen and a life-long resident of Alaska, I am appalled—outraged would perhaps be a better term--that the State would consider financing nonresidents to such an extent, in both money and land, when a resident [redacted] cannot get funds to clear a few acres.

March 8, 1980 (i)

I would like to register a complaint with the teleconference. Iwent to the teleconference here in Delta Jct. on March 4th with the purpose of giving testimony on the subjects of the bison problem and Delta II.

We listened to people who were physically in Juneau taking up air time- 11/2 hours. I would like to see the following changes made in the teleconference procedures:

1. Have the people who are in Juneau stay off the air. They can diacuss the scheduled topic at the end of the conference.

2. When a committee wishes to address a specific subject such as Delta II or the Bison, let the Delta office hear all who wish to teatify before moving on to the other stations. A time limit of 3 to 5 minutes per speaker may be necessary.

TESTIMONY I HAD PREPARED FOR THE TELECONFERENCE MARCH 4th

My name is Henry Muth and I want to direct this to anyone who can do some good.
Born in Alaska and raised on a dairy farm in the Sand Lake area of Anchorage, our homestead at Anchor Point, in Homer, and finally ending up in the Matanuska Valley. I was directly involved in agriculture up until Sept. 1979, when my brother and I had a falling out. For the sake of peace in the family, I left the farm. I ended up in the Delta Jct. area working for an implement dealer.

I know from my own experience that you can make a go of farming in Alaska, with good management and state support. Ihope to be directly involved in agriculture again in the near future.

First subject of concern: The Bison- I'm sure you've heard this before and will again, but here it goes anyway.

1. The farmers need immediate relief for the damages done to last years crop. Immediate planning within the next 6 weeks, before spring planting time.

2. A crop insurance program should be set up to cover future losses until a program is devised and implemented to control the buffalo.

3. Set aside a chain linked fenced area to keep the buffalo in year round. See Delta Economic Development Committee Resolution # 81-101.

(2)

Second Subject: Slaughter Facility- It should be built in the Delta Jct. area for the following reasons:

1. there already is the nucleus of a beef industry and swine industry here already. We are 3 years ahead of any other new areas in the state.

2. Contrary to what Mr Tomlin says the Interior is ideally suited for beef production.

3. It makes far more sense to keep the hauling of the raw materials as low as possible- especially with livestock, and then hauling the concentrated finish product.

As Mr. Wilson put in his report, this slaughter facility would breaak up the chicken or the egg syndrome, so prevalent in the meat industry in Alaska.

With planning, the completion date of the facility could coincide with the first market weight animals.

With Delta II coming up, it would be a good time to anylyze this topic. See Delta Economic Development Committee Resolutin #81-102

DELTA II- I am emphatically in favor of Delta II, the only changes that I would support would be making the tract sizes smaller. Advantages of smaller tracts under 1000 acres:
1. Get more people involved. You would have a broader cross section of talent.
2. From a machinery and labor aspect, it seems when you get over 1000 acres, your needs get really expensive.
3. Why release to the people so late in the year? Why not move it From Sept. to June or July at he latest to give successful applicants a chance to get a few summertime projects done. Also there are a few farmers who purchased clearing machinery banking on Delta II being on schedule and are finished with it and stuck with the payments and interest until conceivably next year.

FINANCING- With allthe money I've seen spent over the years studying different ag. enterprises, it seems that unless the State of Alaska is willing to back the farmers to the maximum, all the money spent on studies was for nothing.

A financing package I feel would be equitable for most everyone would be:
1. Down payment; Allow credits for agriculture experience
I see no difference between someone like myself, with no money, but my whole life to put into a project, or someone who is a little better financially putting their life savings into a project.
2. Amoritorium on interest and principal during the start up phase with repayment based on time period or level of income or combination of both, with a clause stating that irregardless of income at the end of a specified time period full payments will be made.

(3)

I also feel that someone should look into the inequieties of our current system. If an individual is solvent enough to be allowed to get a tract of land in a project such as Delta 1 why,when it comes to getting his operation financied he is totaly unsuccessful. This has happened more than once inthe Delta 1 project Did the indviduals financial picture change? I don't think so. Did the State of Alaska change its policy? I don't think so. I have a bad feeling that local personalities and politics comes into play. I don't know both sides of the story but standing on the edge and looking in something sure smells bad.

The current system puts one or a best six, who are influenced by one, in a position to control the destiny's of 40 to 50 farmers. The farmers never go before the board to present their plan, it is subject to the interputions of an examiner, who sometimes displays very little knowledg about the he was hired to perform. Enough on that, if you want more I can g et it for you.

Agricultures need for capital is insatiable and also very immediate I think that is common knowledge, what doesn't seem to be to well known is that the money will be returned many times over.
I hope that by now the different departments involved in approving money for agriculture have a good handle on the financing level necessary for the sucess of the industry. $100,000,000.00 would be enough to sufficiently finance the programs already begun and the ones in the future. The State of Alaska should be prepared to replentish this amount if neceassary.

I certainly hope the bugs are worked out of the system soon for I am giving strong consideration to applying for Delta II, and would like to get all the support I need in all the various areas of successful farm operation.

thank you

Henry Muth

Lynn Rice
SR 20186-A
Fairbanks, Alaska 99701

March 13, 1981

House and Senate Resource Committees
State Capitol
Juneau, Alaska 99811

Dear Rep. Gardiner,

I am submitting the following oral testimony given at the teleconference on small-scale and village agriculture. As you mentioned over the teleconference, I am submitting this so it may be included as written testimony, and so that members of the committees may receive a copy.

Thankyou for your attention in this matter.

Sincerely,

Lynn Rice

P.S. I will be submitting a supplement to this in a few days.

The following was submitted as oral testimony at the teleconference on village agriculture and the needs of small-scale agriculture, Friday, March 6.

"My name is Lynn Rice, and I represent myself. This testimony is in regards to small-scale farming and large-scale farming.

"I have one suggestion for the land which is to be cleared for the agriculture project, and two areas of concern.

"My suggestion for the 'clear and burn' method of preparing land for agriculture is an alternative: open the land which is to be cleared to private woodcutters (individuals or companies) so that the wood may be utilized for firewood (an energy source), furniture, loghouses, pulp, or whatever. The remaining brush and branches can be burned for ash to contribute to the soil quality. I don't see any reason to require regulation in this cutting.

"My first area of concern is Integrated Pest Management, or IPM for short, and the development and implementation of Integrated Pest Management techniques.

"Practices of using pesticides to eliminate insect pests have resulted in spray drift and run-off which can migrate into water supplies and harm other life such as birds or fish, besides ourselves.

"Two states which are involved in intensive farming are California and Hawaii, and contamination of water supplies is becoming a problem.

"Because of the rapid life cycles of insects, they are able to adapt and survive increasing doses of toxic insecticides. Many of these insecticides have proved to be carcinogenic to animals, and they are applied to our food.

"Soils sprayed only once have been found to be contaminated fifteen years later. Many agricultural crops are sprayed a dozen or more times <u>during a single season</u>.

"These poisons can accumulate. The residues from pesticides and herbicides many times can not be washed off foods. Many pesticides used today are systemic - which means they are absorbed by the plant from the soil into the plants system. An insect consumes a part of the plant and dies. Such pesticides are supposed to "disappear" before the produce gets to market, but some states hire people to test the food for residues so that food with too high a level of poison still in its system is not allowed to be marketed.

"The farmer is most exposed to these poisons, as he or she are in the midst of the sprays and applications being applied to the crops. Robert Rodale, editor of <u>Prevention</u> magazine points out "Respiratory and nerve problems are an early warning sign of overexposure to toxic chemicals, such as pesticides. And farmers who rely heavily on the use of pesticides would be more likely to suffer from these problems". He asks, "Is life on the farm turning into an obstacle course through a chemical jungle? Many farmers think so, and that's one reason they're turning to organic methods in growing numbers. They want to get as far as possible from the skull and crossbones on the chemical can, and all the hazards to health that they symbolize". He points out, "The war against cancer needs to be fought in the laboratories and test plots of <u>agricultural</u> researchers, as well as in the medical schools".

"Integrated Pest Management utilizes a variety of techniques, including controlling pests by using their natural preditors or other biological methods; selecting crops and varieties of plants that are resistant to insects and diseases and suited to the particular climate and soil they are to be planted in; cultivation practices such as companion planting, mulching, tillage, and crop rotation are also used in the management program.

"In Washington state where they are doing extensive research in IPM and hold workshops on organic farming, they include limited application of pesticides but emphasize that this application is at strategic points of the insects life cycle so that the pesticide has the greatest possible effect. They point out there is a large energy savings in IPM.

"My second concern is for organic farming to replace intensive chemical farming.

"Organic farming emphasizes the building up of organic matter (humus) in the soil as an alternative to applying chemical fertilizers. Adelle Davis in her research points out the importance of bacteria, fungi, and molds in the soil. These allow nutrients in the soil to be absorbed by plants. According to Davis, chemical fertilizers (specifically the sulfer which is found in superphosphate, and ammonium sulfate and potassium sulfate, which is called potash) become toxic to the fungi essential to the plants ability to absorb minerals. The plants still grow but lack full nutritive value. Without sufficient humus, molds, which produce antibiotics, cannot grow. Because insects do not like these antibiotics, molds found in the soil are important to the resistance of plants to insects.

"'Good' bacteria, fungi, and actinomycetes prevent disease organisms from establishing themselves in numbers sufficiently large to cause symptoms in plants. (From: Baker and Cook, prof. plant pathology at Berkeley, and research plant pathologist at the USDA Experiment Station there who wrote Biological Control of Plant Pathogens, 1975).

"Experiments conducted on land which has been built up with minerals and humus increased the protien content of plants, increased the trace minerals found in the plants, and enabled the plants to resist insects and diseases.

"In closing I'd like to summarize the advantages of organic farming and Integrated Pest Management, and some suggestions.

"The advantages:

1) Organic foods generally bring a higher market value. I understand that there is a large demand for organically grown foods in Japan.

2) With the rising cost of oil, chemical fertilizers and pesticides which are derivatives of petroleum will become increasingly expensive, not to mention that oil is a non-renewable resource which we are supposed to eventually run out of.

3) The battle of pests in the fields with pesticides is a losing one - the pesticides must be stronger and more toxic every season, and the insects

become increasingly resistant.

4) From the standpoint of health - less exposure of farmers to toxic chemicals; less exposure to consumers to pesticide residues; and you should have food with a higher nutritive value.

5) From the environmental standpoint - prevention of chemical runoff (primarily from pesticides and herbicides) which can endanger quality of water supplies; prevention of spraydrift into other areas of the environment which could affect animals, birds, and fish; prevention of chemical fertilizers such as phosphates running off into water systems causing over-production of algae with the potential of smothering fish. I'd like to mention that there are experiments being done now to increase fish stock in lakes by fertilizing the lake - what I am talking about is larger doses brought about by heavy applications from chemical farming on water systems. (Example is in Montana-Idaho region where lakes have gone through eutrophication, receded, and are in the process of disappearing).

"I recommend the following:

1) That provisions be included in the bill that would create a 'Department of Agriculture' which would emphasize implementing of IPM and organic farming methods.

2) Cooperative Extension Service be funded and directed specifically to provide information and workshops so that farmers may properly implement IPM and organic farming techniques.

3) Perhaps have a large scale farmer who has been successful with IPM and organic farming or some other person of proven expertise be called on as a consultant to speak with the state's farming related organizations and departments about IPM and organic farming and how they may make a successful transition from chemical farming.

4) Provide funding for the Agricultural Experiment Station for the positions of an 'agricultural entomologist', an 'agricultural plant pathologist', and one in 'weed science', so that conditions that are particular to Alaska may be explored and IPM and organic farming strategies may be employed. I'd like to point out that these requests are on their list.

5) If farmers are made aware of the economic advantages which seem to be there, this should be their incentive. If you can think of any other incentives, perhaps a loan program to farmers to try these 'new' techniques so that a transfer away from pesticides, herbicides, and chemical fertilizers may begin.

6) Coordination of MacKenzie Dairy Project using manure and bedding wastes for the local agriculture. This could alleviate run-offs from feedlots (if used) which can cause problems due to the high nitrogen content of the animal wastes. Animal wastes from a slaughter plant might also be integrated into this (it was mentioned a couple of days ago the importance of utilizing all of the animal). Blood meal (12% nitrogen) bone meal for phosphorus are examples of what can be utilized. Returning crop residues to the soil and using nitrogen fixing plants such as clover or alfalfa in crop rotation

would be part of the alternative. Using fish wastes from processing might also be included.

"Idea: Constructing a rotatable or movable fence for acrages - using the method of crop rotation, fence in only the barley crop, leaving the crop 'in fallow' outside of the fence. The crop which is in fallow should be planted with a nitrogen fixing plant such as a clover or legume. The bison may then graze freely on the fallow fields, preventing them from eating the marketable grains and actually contributing to the farmer by dropping manure as the bison graze. A person that testified the other day noted the increase of fish and game records of bison taken which occured with the development of agriculture. I have heard that this increase of large animals such as moose occurs with agricultural development, which is the case in Sweden.

8) Organic farming is also helpful in preventing erosion (by having a high humus level).

"Thankyou for this time".

Ms. Lynn Rice
SR 20186-A
Fairbanks, Alaska 99701

April 9, 1981

Members of the House and Senate Resource Committees
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Legislators,

The following copies are submitted as a supplement to written testimony of March 8, 1981 regarding agriculture development in Alaska.

This supplement is submitted as input from various agencies on organic farming and integrated pest management (Washington State University Agricultural Research Center, University of Alaska Agricultural Experiment Station, University of Alaska Cooperative Extension Service); excerpts from The Gardener's Guide to Better Soil are included to show examples of commercial organic fertilizer and green manure as a fertilizer; articles from Organic Gardening (3/81) show methods of organic fertilizing and research on attracting beneficial insects; an advertisement from the magazine shows that integrated pest management (IPM) and organic farming products are available commercially; The Plowboy interview of Ram Bux Singh from the Mother Earth News (Nov. 1972) describes the progress of Singhs research in India on methane and fertilizer producing digesters from wastes - I am including this as a possibility of use of digesters to the advantage of farmers for energy, for the alleviation of wastes, and for producing organic fertilizer.

Several other items are included which I see as applicable to the subject and possibly of interest to you.

I appreciate any time you give to look over these items. I hope you will keep in mind organic methods of farming and integrated pest management and will support it in legislative actions.

Sincerely,

Lynn Rice

(No enclosures)

WASHINGTON STATE UNIVERSITY
AGRICULTURAL RESEARCH CENTER

403 AGRICULTURAL SCIENCES PHASE II, PULLMAN, WASHINGTON 99164 Phone 509-335-4563

April 10, 1980

Ms. Lynn Rice
F-4 Cedar Park
Juneau, Alaska 99801

Dear Ms. Rice:

I am responding to your letter of March 6, 1980 to Governor Ray asking for increased support of organic farming research and education.

This is an area of concern that has received national interest. The United States Department of Agriculture is conducting an extensive study of organic farming which is presently in review. This study could lead to the development of a national policy statement on organic farming.

Rising energy costs are having and will continue to have an increasingly profound impact on our energy intensive system of agriculture. However, we must all recognize that there are trade-offs associated with a move to organic farming methods. Two obvious results are a more labor intensive method of agriculture and a reduction in yields.

Washington State University was a leader in the area of integrated pest management - a system that results in a large energy savings. Incidentally, the term "integrated pest management" is a great deal broader than you described it. The attached bulletin more fully details the complex system that results in the "integrated" approach.

Washington State University also has strong research programs in erosion control, minimum or reduced tillage systems, improved biological efficiency in plants, increased nitrogen fixation, and improved crop management systems. We have held workshops on organic farming, with emphasis on soil fertility management. We are placing increased emphasis on making our research results available and applicable to small farmers.

The concerns expressed in your letter are important and our scientists are working on many of them. In that regard, I have shared your letter with some scientists so that they can include your considerations in their research programs.

Again, I want you to know that we share many of your concerns and appreciate your interests in preserving the natural resources so critical to a strong agricultural sector of our economy.

Best regards,

Landis L. Boyd
Director of Research

LLB:sgb

Attachment

cc: Governor Ray
Wallis Beasley, Executive Vice President
J. S. Robins, Dean, College of Agriculture
J. O. Young, Director of Extension

Introduction

INTEGRATED PEST MANAGEMENT (IPM) is a system that utilizes all suitable pest control techniques and methods to keep pest populations below economically injurious levels. Each pest control technique must be environmentally sound and compatible with production and user* objectives. Integrated Pest Management is more than chemical pesticide management. In many cases, it includes biological, cultural, and sanitary control practices for all pest complexes.

Cooperative Extension Service (CES) Integrated Pest Management programs are operational in the majority of states. These are directed primarily at commercial agricultural crops and livestock where research technology is available and the benefits of IPM programs can be demonstrated. This report provides a rationale to further develop IPM programs in commercial agriculture and to initiate additional programs in the areas of livestock production, specialty crops, storage commodities, small and part-time farms, home gardens, forestry and wood products, and public health.

The primary role of the Cooperative Extension Service in IPM is:

(1) to plan and organize programs,

(2) to solicit participation of clientele in each type of program,

(3) to develop appropriate educational materials,

(4) to train personnel involved in programs,

(5) to demonstrate new pest management technology and provide technical assistance to active programs,

(6) to collect and process data needed for program execution, and

(7) to evaluate and document results.

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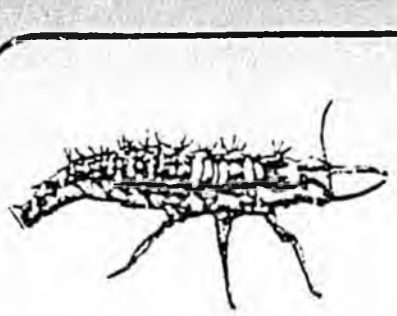
*Refers to homeowner, producer, farmer, etc.



PEST MANAGEMENT
WHAT IT IS
WHAT IT HOPES TO DO

EM 3878 SEPTEMBER 1974

Pest management combines pest control approaches, building them into a management system. It adjusts to the interactions between a group of pests, the cropping system of the area, and the wider surrounding environment.

The concept comes from the realization that any disruption of a pest, be it insect, mite, nematode, plant disease, or weed, will tend to affect the status of other pests in the crop complex. Pest management attempts to develop and use techniques to control pests, not to eradicate them. In the production of food and fiber, man has learned that more balanced cropping systems with greater diversity tend to undergo fewer violent outbreaks of pest species. For this reason it has been easier to develop management systems in fairly stable environments, such as tree fruits, forests, or alfalfa, than in annual crops which consist of more disrupted environments.

PEST MANAGEMENT PROJECTS

Washington State is developing two pest management projects, one in tree fruits and a second in alfalfa seed production. These federal extension-sponsored programs are part of a national system that is supported through many sources, including the Animal and Plant Health Inspection Service of USDA. There are 39 projects in 29 states, involving 19 major crops.

Where pest management techniques are well developed and adequate management advice is available, the projects are called action programs. Where techniques are still being developed, the projects are called pilot programs. The two programs in Washington for the most part are pilot. In all of these programs there is extensive support from state and USDA research investigators as well as from other state agencies and grower groups.

Most projects have begun by concentrating on major pests in a crop. Other pests have been included as more is learned about pest-crop system interactions. Thus, for Washington tree fruits, efforts have concentrated on mites, codling moth, Oriental fruit moth, and pear psylla. Programs are being developed for fire blight of pears, peach twig borer, and several types of aphids. Future needs call for a knowledge of how cover crop and weed complexes affect lygus and other bugs, cutworms, and plant diseases, as well as beneficial insects.

In alfalfa seed pest management, the main concern has been to protect and encourage two species of pollinating bees, and to control lygus, two-spotted mites, and aphids. Techniques are being developed for better pollinator bee management and alfalfa weevil control. Future needs include improved control of nematodes, diseases, and weeds. This is particularly desirable where weeds exert deleterious effects upon the pollinator or insect pest management programs.

ADVANTAGES OF PEST MANAGEMENT

What advantages does pest management have over the application of pesticide chemicals on

COOPERATIVE EXTENSION SERVICE • COLLEGE OF AGRICULTURE • WASHINGTON STATE UNIVERSITY • PULLMAN
In cooperation with the United States Department of Agriculture
Issued in furtherance of the Acts of May 8 and June 30, 1914, by the Washington State University
Cooperative Extension Service, J. O. Young, Director

a routine schedule? First, experience shows that excessive use of pesticides has led to resistance in many insects, mites, nematodes, weeds, and disease organisms. We must employ pesticides more carefully and sparingly to extend the usefulness of compounds. Second, reduced pesticide usage lowers production costs for growers in terms of materials, equipment wear, and labor. A third factor, most pesticides are petroleum-based chemicals, a fossil resource in diminishing supply. Finally, and very importantly, many pesticides are toxic on either a short- or long-term basis to a variety of organisms that contribute to man's pleasure in his environment–such as birds and game fish. We should use pesticides only when necessary and they must be applied correctly.

TECHNIQUES USED

What techniques are used in pest management? One important concept is that of economic injury–determining that level at which pests may cause damage serious enough to pay for the costs of control. The pest manager must also understand pest life cycles so that controls can be applied during the pest's most vulnerable stages. Another essential part of pest management programs is good pest population measuring techniques, such as the use of sex-attractant traps, sweep nets, leaf counts for mites, fungus spore counts, nematode cyst counts, and indices of weed populations. Further good management practices will reduce the reservoir of pest species through sanitation by destroying plant parts containing disease organisms or insects; and watering that provides adequate plant growth but is not excessive enough to encourage diseases. Another technique is the use of plant varieties resistant to pest attack. Other methods are encouragement and release of organisms causing diseases of pests, or those that parasitize or consume them. Many techniques are known or are in promising stages of development at present; the trick is to educate growers and pest control consultants so that they can incorporate these into interdependent management systems.

ADOPTING A NEW CONCEPT

Since the objectives of pest management seem worthwhile and logical, why doesn't everyone adopt this concept immediately? Part of the problem is natural resistance to change, particularly if rather successful systems are already practiced. To change requires the acceptance of new knowledge, and it is simply easier to apply pesticides on a regular schedule than to evaluate the problem continuously.

Another factor involves reduced pesticide sales potential for field pest control advisers with agrichemical companies. They are generally in more frequent contact with their clientele than are Extension agents and other public service personnel. Many chemical company pest control advisers have a wealth of experience in pest control procedures. Their knowledge and experience would be, and often is, a real asset to pest management programs, particularly when they learn and promote pest management techniques. Their company management hopefully will develop means of charging for this service to compensate for reduced chemical sales, to the benefit of growers, our environment, and our increasingly scarce resources.

Pest management combines rather complex pest control techniques to provide fairly obvious advantages to society. It does not necessarily reduce pesticide applications, rather in some instances it merely results in more logical use of pesticides. A strategic application of pesticide can dramatically improve market grade and thus greatly benefit grower returns. However, we believe that the

cost of pesticide applications can be reduced significantly on apples, peaches, and perhaps other tree fruits.

Pest management programs under development in Washington are designed to test and promote these improved concepts—their objectives are to get growers, whenever possible, to use pest management and to abandon routine applications of pesticides. It is not an objective of Washington's pest management projects to displace existing pest control consultants. Rather, we intend to encourage consultants to improve existing practices and to more fully adopt pest management, thus providing better service to growers and to society.

Prepared by Robert Harwood and Carl Johansen, entomologists, and Art Retan, Extension entomologist, Washington State University, Pullman; and Jack Eves, pest management coordinator, Washington State University, Prosser.

CONCEPTS OF INTEGRATED PEST MANAGEMENT IN WASHINGTON

Introduction

Integrated pest management (IPM) is the management of pest populations below levels that cause economic damage by using a compatible balance of biological, cultural, chemical, and genetic control methods. Control may be aimed at one or more pests depending on the scope and complexity of the management system. Regardless of different pests, IPM takes into account interactions among pests, environment, and commodity. IPM differes from traditional control approaches where each pest was considered and controlled individually.

The concept comes from the realization that any disruption of a pest will tend to affect other pests in the crop complex. Integrated pest management attempts to develop and use techniques to control pests, not to eradicate them. In the production of food and fiber, man has learned that more balanced cropping systems with greater diversity tend to undergo fewer violent outbreaks of pest species. For this reason, it has been easier to develop management systems in fairly stable environments, such as tree fruits, forests, or alfalfa, than in annual crops which consist of more disrupted environments.

Approach

Integrated pest management systems need to be flexible and broad and various approaches may be taken when employing an IPM system. One possible approach follows:

1. Identify pests that must be managed. Pests are insects, weeds, and plant pathogens such as fungi, bacteria, viruses and nematodes that economically damage crops or plants.

2. Define the management unit. A single field may be a unit if a soil-borne nematode with low mobility is the key pest or a subcontinent may be a unit if a widely disseminated pest, such as leaf rust of wheat, is the key pest.
3. Develop a pest management strategy with the coordinated use of multiple control tactics. Combinations of control tactics need to be effective and efficient and designed to protect beneficial organisms and the environment. The strategy may vary with time period and situation for a given crop. Biology of the pest and possible interactions are considered. For example, interactions between the pest and the environment, such as an increase in predator populations or the effect of weather on the sporulation of a fungus, may dictate an effective timing or utilization of a control practice.
4. Develop reliable monitoring techniques. Sampling methods must accurately assess numbers of pests and beneficial organisms per unit of field, orchard, or other type of planting. This information is critical to determine population trends and for decision-making. For example, wireworm numbers in soil samples must be analyzed to determine when and if treatment is necessary.
5. Determine economic thresholds or the relation between the pest population, amount of damage, and cost of control. If a pest population is below a specific level, it may cost more to control than the dollar return from the control.
6. Develop descriptive and predictive models. Models are useful tools in predicting pest epidemics and determining pesticide application, identifying knowledge gaps for research, and organizing an approach for research or a strategy for control.

Objectives

Objectives of Washington IPM programs are to develop and implement programs and to disseminate information on pest management through the approach listed previously. Possible objectives are:

1. Develop effective monitoring techniques for pest and beneficial populations and determine economic thresholds to facilitate management decisions.
2. Optimize pesticide use, reduce their impact on non-target organisms, and combine their use with other management practices.
3. Improve crop yield and quality and economic returns by managing pest populations and reducing pest control costs.

Advantages of Pest Management

What advantages does pest management have over the application of pesticide chemicals on a routine schedule? First, experience shows that excessive use of pesticides has led to resistance in many pest organisms. We must employ pesticides carefully and sparingly to extend the usefulness of compounds. Second, reduced pesticide usage lowers production costs for growers in terms of materials, equipment, wear, and labor. Third, most pesticides are petroleum-based chemicals, a fossil resource in diminishing supply. Finally, and very importantly, many pesticides are toxic on either a short- or long-term basis to a variety of organisms that contribute to man's pleasure in his environment--such as birds and game fish. We should use pesticides only when necessary and they must be applied correctly.

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use of pesticides. A strategic application of pesticide can dramatically improve market grade and thus greatly benefit grower returns.

Washington IPM Programs

Washington has ongoing IPM programs on alfalfa seed and tree fruits and new projects on hops and potatoes. These programs involve people from government and private industry for research and dissemination of pest management information. The alfalfa seed and tree fruit projects are now mostly conducted by consultants, fieldmen, and growers with Washington State University providing updated information. In most crops, there are some IPM techniques being used, but there is a need for a unified, compatible, integrated, total crop management system.

Prepared by Dan Mayer and Dennis Johnson, IPM Extension Specialists, Washington State University, Prosser; Carl Johansen, Entomologist, and Art Retan, Extension Entomologist, Washington State University, Pullman.

UNIVERSITY OF ALASKA, FAIRBANKS
Fairbanks, Alaska 99701

School of Agriculture and Land Resources Management
Agricultural Experiment Station

May 12, 1980

Ms. Lynn Rice
F-4 Cedar Park
Juneau, Alaska 99801

Dear Ms. Rice:

I was pleased to receive your letter outlining your support for organic farming and integrated pest management in Alaska. There is renewed interest across the United States in making optimum use of legumes, green manure crops, animal manure and sewage sludge in crop production. In addition, there is interest in integrated pest management: the use of combinations of technological and biological practices to control weeds, insects and diseases in an economically and environmentally sound manner.

Farmers for centuries have used animal manures and green manure crops to improve their soils. These materials release important plant nutrients to the soil and replenish organic matter. Their effect improves not only the nutrient status of the soil, but also the physical condition of the soil. Moreover, farmers have traditionally used various combinations of practices including tillage, fallowing, crop rotations, crop varieties bred for insect and disease resistance, and pesticides to control weeds, insects and diseases.

Farmers producing agricultural commodities that provide a relatively high return per acre, such as vegetables or milk, on farms several hundred acres or less in size have traditionally used animal manures. For example, Alaska's dairy farmers in the Matanuska Valley spread manure from their dairy barns on nearby fields to produce hay or silage for their dairy cows.

Farmers producing commodities that have a relatively low return per acre, such as cereal grains, need farms more than several hundred acres in size, and are unable to use animal manure to meet more than a small part of their fertilizer requirements. Animal manure is a low analysis fertilizer. For example, it contains only 0.5% nitrogen whereas urea (a commercial fertilizer made from natural gas) contains 45% nitrogen.

Commercial production of a cereal grain such as barley in interior Alaska requires about 60 pounds of nitrogen per acre per year. Thus, 12,000 pounds or 6 tons of animal manure per acre per year would be needed to supply the nitrogen requirements for a barley crop whereas only 133 pounds of urea per acre per year would be needed. The cost of fossil fuel or other energy source needed to transport and spread 6 tons of manure in comparison with 133 pounds of dry fertilizer makes it very difficult for the farmer producing cereal grains to supply his total fertilizer needs with manure. Nevertheless, the cereal grains he produces are needed for feed grain for the lactating cows milked by the dairy farmer, and as food for direct human consumption.

As the problem of disposal of animal and human wastes increases in the future, I am convinced that increasing amounts of these materials will be applied to the land in Alaska. Before this happens, however, the consumer must be willing to bear the cost of fossil fuel or other energy sources (including human labor) to process, transport and apply the relatively low analysis animal wastes to the land.

The use of green manure crops and legumes represents another segment of organic farming that has potential for improving soils in Alaska. Symbotic fixation of nitrogen by legumes has been used to advantage in Alaska's dairy industry, for example, by growing Canadian field peas (a legume) in combination with oats as a forage crop. Unfortunately, however, most legumes grown as agricultural crops elsewhere are not well adapted to Alaskan growing conditions. And, so far, no native Alaskan legumes have been found that can be effectively utilized in agriculture in Alaska.

The Alaska Agricultural Experiment Station has carried out research on legumes for many years. Some progress is being made toward developing legumes (including an adapted variety of alfalfa) that may be agriculturally useful in Alaska. Continuation of this work depends on continued federal and state support for agricultural research.

We must be very careful, however, not to mislead Alaskan farmers by recommending a legume such as the soybean for Alaska. Unfortunately, the varieties of soybeans available to the agricultural industry cannot be grown at northern latitudes. The soybean is extremely sensitive to photoperiods. It is a short-day plant, and most varieties require at least 10 hours of daily darkness to flower and produce seed. Although soybeans will grow at northern latitudes, they will not produce seed. The seed is the portion of the plant that is harvested for oil and protein. Thus, soybeans are not grown commercially in northern countries such as Sweden, Finland, Canada, northern Russia or in Alaska.

You will be interested to know that the Agricultural Experiment Station plans to initiate a research program in integrated pest management if the FY 81 budget requested by the Experiment Station is approved by the Alaska state legislature. Unfortunately, we have not had funds for research positions in weed science, agricultural plant pathology or agricultural entomology during recent years. Our budget request for FY 81 approved by the Board of Regents, however, includes funds to initiate research in integrated pest management with emphasis initially on weed control. We hope to obtain funds in future years to add a plant pathologist and an entomologist to our staff so that a more complete program in integrated pest management can be developed.

In the meantime, many of the biological controls for insects developed elsewhere are not adapted to Alaskan field conditions, although they may have value in greenhouse operations. The cutworm is a major Lepidoptera pest on agricultural crops in Alaska. However, the organism (bacillus thuringiensis) that you mentioned has not been an effective control apparently because applications do not reach below-ground parts of the plant where the cutworm operates. Possibly some of the virus diseases would provide effective control for cutworms. Japanese beetles that you mentioned are not a problem in Alaska. In terms of predatory insects, we have fairly high native populations of ladybugs and lacewing larvae in Alaska, but praying mantises are not adapted to the environment. It would be extremely valuable, however, if we could employ an entomologist to investigate some of the biological relationships in insect control.

If you are interested in additional information about integrated pest management, I recommend that you write to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for a book entitled Pest Management Strategies, Volume II, Stock No. 052-003-00709-6. This book was published in 1979 and is a comprehensive analysis of pest management in different regions of the United States that was prepared for the Office of Technology Assessment, United States Congress.

This year, through a special grant from the U.S. Department of Agriculture, we have begun a research program within the Delta Agricultural Project to develop improved practices to control soil and water erosion and potential pollution from agricultural lands. The program involves comparisons of conventional tillage, minimum tillage and no-till systems with different crop rotations for the production of small grains and rapeseed. Minimum tillage and no-till systems are receiving widespread attention elsewhere because they leave crop residues on the surface to protect the soil from wind and water erosion, and because they conserve energy by reducing the number of farming operations.

On the other hand, crop residues on the surface of the soil may enhance certain insect or diseases, and reduced tillage may require

additional herbicides for weed control. We will be studying various practices to protect the soil from erosion, to improve soil fertility, and to protect the crops from weeds, insects and diseases.

In cooperation with the Cooperative Extension Service, we will hold a field day at Delta Junction on August 2, 1980. The field day will be open to the public and will involve a bus tour to view the agricultural development project and our field research program.

You may wish to attend the field day to see farming practices in interior Alaska and our research program in the field.

Sincerely,

James V. Drew
Dean and Director

JVD:ds

less than to weaker plants are probably witnessing the same situation. Plants abundantly supplied with nitrogen may taste as bad to leaf-eating bugs as grass oversupplied with nitrates tastes to cattle.

If nitrogen can build a certain amount of bug resistance to a plant, it has the opposite effect in regard to fungal diseases. Plants abundantly supplied are more susceptible. You win some, lose some.

Long-lasting, slow-release organic nitrogen is such a good fertilizer it goes on working in the fall when you'd just as soon it didn't. In some cases, bush fruits, like raspberries, will grow vigorously in the fall on rich ground (especially if the fall is wet) and that growth may winterkill. Try to apply high nitrogen fertilizers to such plants only in spring or early summer.

Nitrogen Sources

Which nitrogen fertilizer is better, organic or inorganic chemical?[3] I don't think there's a soil scientist who will not admit that organic methods are a better way to handle the soil than with bags of chemicals.

As to which kind of soil—organically handled or chemically treated—produces the tastier fruits and vegetables, there's no disputing tastes. I know two brothers who prefer canned peas to fresh ones. But I find it hard to see how certain chemical champions dismiss the possibility that soil management can influence the taste of the crop.[4] Too much nitrogen, especially if accompanied by too little potassium and lots of water, produces less tasty vegetables, especially corn and melons. This is particularly true if the nitrogen comes from a bag of chemicals and the water is irrigation water, not rain. Experienced gardeners know that. So if some cultural practices change the taste of the product, why not admit the possibility that other practices might change taste too?

Manures

Animal manures remain the best all-around organic fertilizer. They are not as high in nitrogen as some other organic sources, but they are still available in quantity in many areas and they build organic matter content at a faster rate than most other organic fertilizers. Manures vary in nitrogen content: rabbit droppings contain 2½ percent on the average, and poultry manure 1½ percent. Hog and cow manure have the lowest content of nitrogen of all barnyard manures. That's why they are rarely used in hotbeds—not enough nitrogen to make the heap under the hotbed get hot. Horse manure is the preferred hotbed manure.[5]

(*Handling*) The fertility value of manure depends also on the way it's handled. If piled out in the weather unprotected, the manure loses nutrients that leach away in falling rain. Pound for pound, rotted manure kept

A rich mixture of manure and bedding remains the best fertilizer there is. Each forkful contains all the major nutrients, many if not all of the micro-nutrients, and organic matter. Manure has always been central to the organic method.

POULTRY MANURE (Without Litter)

Nitrogen (%N)	Phosphorus (%P)	Potassium (%K)	Calcium (%$CaCO_3$)	Magnesium (%$MgCO_3$)	Boron (p.p.m.B)
2.00	1.88	1.85	2.5	0.4	5

FRESH TURKEY MANURE

Nitrogen (%N)	Phosphorus (%P)	Potassium (%K)
1.31	0.31	0.41

BROILER (Poultry) MANURE

Nitrogen (%N)	Phosphorus (%P)	Potassium (%K)
2.30	1.08	1.69

RABBIT MANURE

Nitrogen (%N)	Phosphorus (%P)	Potassium (%K)
2.40	0.62	0.05

indoors is richer than fresh because it contains less water and is more compact. The nitrogen in rotted manure is not as available as in fresh manure, which is why fresh manure "burns" plants sometimes when it is applied too close to them.

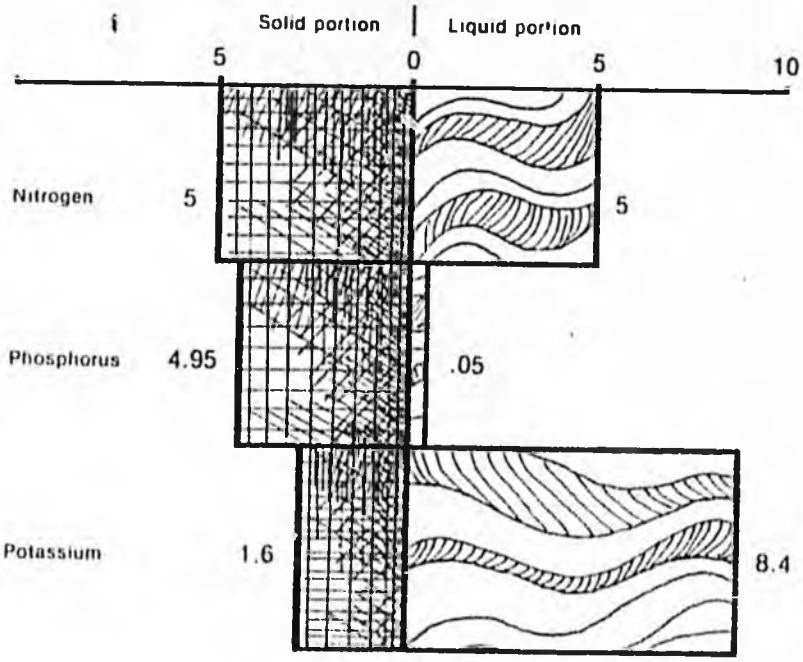
The value of manure is usually increased by the amount of bedding mixed into it because the bedding absorbs the animal urine. Urine is richer in nitrogen and potash than are solid wastes. The straw itself, in addi-

tion to the organic matter it supplies, contains a trace of phosphorus plus about a half percent each of nitrogen and potash.

(*Application*) In applying manure to the soil, farmers and gardeners have always been exhorted to plow, disk, or rotary till the manure into the soil immediately after it is spread. It's an arguable point. If you spread manure on frozen ground, rain or a quick thaw may wash the nutrients into the river rather than into the soil. But manure spread on the land in August will, in the event of rain, leach most of its nutrients right into the top layer of the soil where they belong. There they work more beneficially than if buried six to eight inches deep by plowing. That's why a thin layer of manure spread on pastures, lawns, or growing hay crops does so much good.

MAJOR NUTRIENTS IN COW MANURE (WITH BEDDING)

Nutrients In Pounds Per Ton



The very best way to use manures in the garden is to compost them, then use the resultant material as a fertilizer, dribbling it into the planting trench with the seed. Composting is a high labor project that can be made easier two ways. The first is with chickens. Simply bed them with straw, old hay, or any organic material and let the bedding build up for a year. The chickens, by scratching for grain and other food bits, compost the bedding and manure into a very good, high-nitrogenous fertilizer. The second way is sheet composting—spreading manure as mulch six or more inches deep around garden plants and between rows. Nature will compost it slowly into humus. In the meantime, the mulch suppresses weeds and preserves moisture.

A normally adequate application of manure is a ten tons-per-acre rate. Fifteen tons is better if you can get it and have the time to apply it. Over twenty tons and you may run into the danger of too much nitrogen. But because nitrogen content of manure can vary so much, these rates of application are merely approximations—kind of whistling in the dark. In the garden twenty-five pounds of manure of the dried kind you buy in bags will take care of 100 square feet of garden, if you apply it alongside the rows only. For mulching with stable ma-

PERCENTAGES OF FERTILIZING CONSTITUENTS IN URINE OF VARIOUS FARM ANIMALS AND VALUE IN RELATION TO TOTAL EXCREMENTS

Animal	*Nitrogen* %	*Phosphoric oxide* %	*Potash* %	*Value* %
Horse	35	0	58	50
Cattle	53	5	71	65
Sheep	63	4	86	75
Hogs	32	13	55	40

PROPORTION OF FERTILIZING CONSTITUENTS AND ORGANIC MATTER OF FARM MANURES, INCLUDING LITTER, THAT IS SOLUBLE IN WATER

Animal	*Organic Matter* %	*Nitrogen* %	*Phosphoric oxide* %	*Potash* %
Horse	5	53	53	76
Dairy cow . .	7	50	50	97
Steer	7	56	33	92
Sheep	7	42	58	97

nure, use at least a forkful for every square foot.

(*Manure Production*) There's a formula for determining the amount of manure each kind of barnyard animal produces a year. You weigh how much the animal is fed and then for a horse multiply by 2.1, for a cow 3.8, for a sheep 1.8, and for a chicken 1.6. Add to that the amount of bedding used. This formula won't work for grazing animals, but then you don't collect the droppings from grazing animals either. Another way to figure your fertilizer profits in manure, you homesteaders, is to use the rule of thumb that says a horse will produce about nine tons of manure a year and a cow about eleven tons. Figure three tons for a 200-pound hog, a half ton for a market-sized lamb, and seven tons a year for 100 laying hens. Then calculate the value of the manure as a replacement for fertilizers you would otherwise have to buy. That seven tons of poultry manure, for instance, should contain about 280 pounds of nitrogen, 250 pounds of phosphoric acid, and 140 pounds of potash. If you put that manure on an acre of ground and planted it to corn, you should get a yield of around 125 to 150 bushels per acre, everything else being equal. And that's about how much grain you'll need from an acre to keep 100 hens year-round. Right now, the cost of the commercial fertilizer you'd need to raise that much corn on an acre, if you didn't have the hen manure, would be in excess of $180. The commercial fertilizer would not give you the organic matter or trace elements the hen manure does.

Cottonseed Meal

Cottonseed meal is perhaps the second best source of organic nitrogen. It contains around 7 percent nitrogen, which is good for an organic product. Somewhat acid, cottonseed meal is an ideal nitrogen fertilizer around acid-loving plants like azalea and blueberry. On garden vegetables, it is best to apply lime along with

cottonseed meal if you use the latter regularly. The meal is not always available since so much of it goes to the cattle feeding market. There it's sold as a high protein supplement, cottonseed cake.

Feather Meal

Feather meal, containing about 12 percent nitrogen, makes excellent use of one of the by-products of the broiler business. The feathers are cooked, then dried and ground into meal. If you want a truly slow-release fertilizer, feather meal is the one to choose. It is excellent for applying with your green manure crop.

Bloodmeal

Bloodmeal is one of the richest sources of organic nitrogen you can buy, but the trouble is that you can't buy much of it. Bloodmeal is collected in slaughterhouses, dried and ground. It's too scarce and expensive to use in quantity—a twenty-five pound bag was selling for about fifteen dollars in mid-1974. But the small gardener, needing a lot of nitrogen in a hurry, can get good results with this 12 percent nitrogen fertilizer. Tankage, scraps of waste meat and fat, is a similar source of nitrogen. The animal feed industry uses large amounts of tankage and dried blood as protein supplements in its feed mixes.

Fish

Fish scraps are high in nitrogen too. I've often thought there were four ideal places for an organic farmer to live: near a feedlot-packing house operation where lots of manure and meat wastes would be available; near a mushroom farm where he could get good supplies of spent mushroom compost; near a vegetable cannery where scads of vegetable waste could be had for the hauling; or near a commercial fishing port where fish scraps and seaweed could be found in quantity.

Sewage Sludge

Activated sludge can analyze as high as 5 percent nitrogen. It's called "activated" to distinguish it from "digested" sludge. Activated means that air is forced through the sewage causing bubbling which speeds up bacterial action. The bacteria coagulate the organic matter which then settles out of the water, leaving a clear liquid that can be discharged into streams with less danger of pollution. In "digested" sludge, the organic matter settles out by gravity and the water is drained off. Both sludges are good soil conditioners, but the activated type contains more nitrogen and hence makes a better fertilizer for lawns, shrubs, and trees.

Activated sludge is generally heat-treated for sterilization purposes before being made into fertilizer. Such fertilizers are now gaining wide acceptance and are in demand from golf course caretakers especially. No doubt as other sources of nitrogen become scarce and more expensive and as city waste disposal becomes more sophisticated, sludge fertilizers will come into their own and solve both the fertilizer problem on the farm and the waste problem in the cities.

When applying sludge to ground where a lawn is to be started, mix it thoroughly with the soil. Follow recommendations on the bag—application should be between twenty-five and fifty pounds per 100 square feet—or fifteen tons per acre.

Is sludge safe on food crops? It's not yet recommended on vegetables or other plants parts of which are eaten directly, but otherwise most of the experts consider it quite safe as a soil amendment (see note 21). Some people are afraid that a plant fertilized with sludge will take some kind of foul matter up into its fibers which could be transferred to fruit even—if the plant were a tree—and from there to the eater of the fruit. I have a personal experience that will set your mind at ease on this score. The elderberries we often

(4)

UNIVERSITY OF ALASKA, FAIRBANKS
Fairbanks, Alaska 99701
School of Agriculture and Land Resources Management
Agricultural Experiment Station

February 16, 1981

Mrs. Lynn Rice
SR 20186A
Fairbanks, AK 99701

Dear Mrs. Rice:

Enclosed is a list of the Agricultural Experiment Station's prioritized budget increments for FY 82 as you requested by telephone.

The University of Alaska recommended that the first two priorities be sent forward for possible funding by the legislature, but the board of regents deleted item two. Thus, only priority number 1, Forest Management Research, has been submitted for funding.

Sincerely,

Charles Hartman
Executive Officer

CH:st

Enclosure

PRIORITY LIST FOR COMPONENT INCREMENTS

FY 82

Major Administrative Unit: Agricultural Experiment Station

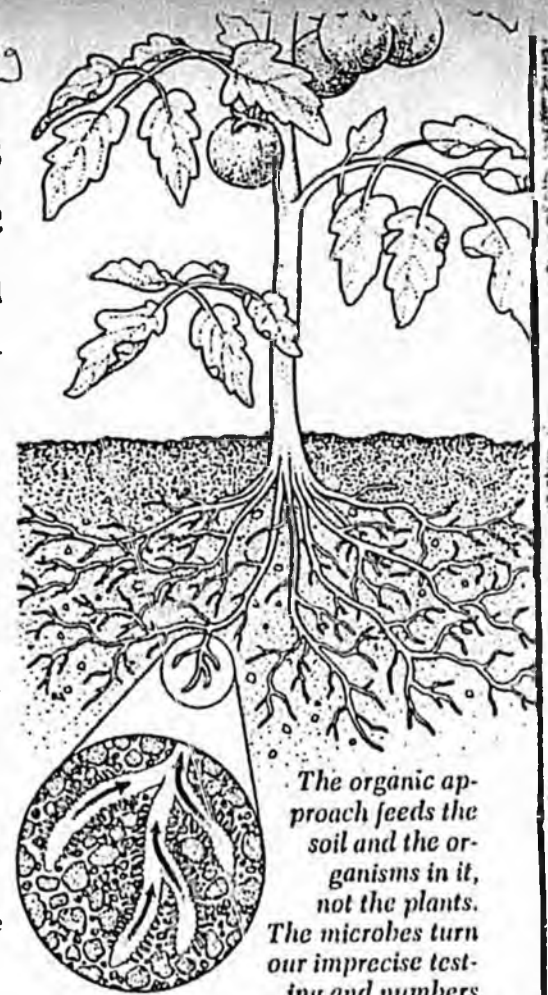
Priority Number	Budget Component	Abbrev. Title of Component Increment	Funding-Listed Priority		Cumulative Funding	
			GF & GFM	TOTAL	GF & GFM	TOTAL
1/16		OR/AES - Forest Management Research, Fairbanks	80.2 (in 1000's #)	80.2	80.2	80.2
2/16		OR/AES - Animal Science Research, Homer	100.0	100.0	180.2	180.2
3/16		OR/AES - Entomology Research, Palmer	79.5	79.5	259.7	259.7
4/16		OR/AES - Publications Program	70.3	70.3	330.0	330.0
5/16		OR/AES - AES Plant Pathology Research, Fairbanks	86.9	86.9	416.9	416.9
6/16		OR/AES - Range Science Research, Homer	100.0	100.0	516.9	516.9
7/16		OR/AES - Horticultural Research, Palmer	128.0	128.0	644.9	644.9
8/16		OR/AES - Applied Reindeer Management Research, Seward Peninsula	276.3	276.3	921.2	921.2
9/16		OR/AES - Home Economics Nutrition Research Program, Fairbanks	182.0	182.0	1103.2	1103.2
10/16		OR/AES - Range Science Research, Palmer	36.0	36.0	1139.2	1139.2
11/16		OR/AES - Veterinary Science Research, Fairbanks	144.5	144.5	1283.7	1283.7
12/16		OR/AES - Soil Testing Program, Palmer	62.0	62.0	1345.7	1345.7
13/16		OR/AES - Forest Soils Research Program	29.8	29.8	1375.5	1375.5
14/16		OR/AES - Soil Classification and Survey Research, Fairbanks	130.2	130.2	1505.7	1505.7
15/16		OR/AES - Animal Science Research, Fairbanks	61.8	61.8	1567.5	1567.5
16/16		OR/AES - Plant Breeding Research Program, Fairbanks	137.0	137.0	1704.5	1704.5

Organic Gardening
March 1981

Soil Tests And the ganic Garden

Don't get lost in the numbers. Soil tests are signposts, not bankbooks.

MORT MATHER



The organic approach feeds the soil and the organisms in it, not the plants. The microbes turn our imprecise testing and numbers into precisely what our plants require.

YOU CAN SEND the same soil sample to three different laboratories and get back three different test results. Test the soil yourself with a kit, and you'll have a fourth result. Soil testing is an imprecise science. But the hard numbers that come back to you from the test seem to speak with authority. Don't feel locked into following them exactly. Soil tests are like highway road signs. They point you in the right direction.

Soil tests have two parts. First, they attempt to tell how much of the major plant nutrients your soil has. The Maine Soil Testing Service, for example, gives values for pH (soil acidity-alkalinity), phosphorus, potassium, calcium and magnesium. Any service will test for these things, and some will even test for micronutrients if you request it.

The pH is the most important item on the test. The pH is given as a number on a scale from 0 to 14. Below 7 the soil is acidic (sour), above 7 it's alkaline, and at 7 it's neutral (sweet). Vegetables respond best to a slightly acid soil (between 6.0 and 6.8). If your pH is not in the 6 to 7 range, some of the nutrients in your soil will not be available to the plants. Phosphorus is the most important element to be tied up in an acid soil. My soil seems to have settled in at 6.2. It hasn't gone up or down on the scale for years, so I have not added lime or anything else to change it.

The amounts of the various nutrients that the test has found in your soil may be expressed in numbers, percentages or words. The Maine test uses the words low, medium, high and very high. I would love to get a test back with a string of "highs" and "very highs," but I'm quite happy with "medium high," and even "medium" doesn't cause me worry. But "low" or "very low" for any element is an immediate call to action.

The second part of the soil test is a section on recommendations. Our soil test lets me ask for organic or chemical recommendations. The organic recommendations they make, however, don't cover all the materials I have available to me. So I now ask for chemical recommendations and convert them for my own fertilizers. I also ignore the recommendation to apply 50 to 100 pounds of lime per 1,000 square feet when the pH is between 6.2 and 6.5 because my soil's pH has become so stable.

I have found that I can maintain a high level of soil fertility through one application of bulky organic material each year. That material is usually an animal manure *mixed* with a vegetable product—wood chips, hay, straw, sawdust, and the like. This year I spread horse manure

PERCENTAGE OF MAJOR NUTRIENTS IN COMMON ORGANIC MATERIALS

	N	P	K		N	P	K
Alfalfa hay	2.45	.50	2.10	Pigeon manure	4.19	2.24	1.41
Animal tankage	8.00	20.00		Pigweed	.60	.16	
Blood meal	15.00	1.30	.70	Pine needles	.46	.12	.03
Bone meal	4.00	21.00	.20	Potatoes, tubers	.35	.15	.50
Cattle manure	.29	.17	.35	Potatoes, leaves	.60	.15	.45
Coffee grounds	2.08	.32	.26	Ragweed	.76	.26	
Corn (grain)	1.65	.65	.40	Red clover hay	2.10	.50	2.00
Corn (green)	.30	.13	.33	Rhubarb stems	.10	.04	.35
Cottonseed	3.15	1.25	1.15	Seaweed	1.68	.75	4.93
Cotton dust	1.32	.45	.36	Sheep manure	.55	.31	.15
Crabgrass (green)	.66	.19	.71	Shrimp waste	2.87	9.95	
Duck manure	1.12	1.44	.49	Soot from chimney flues	.5-11	1.05	.35
Eggshells	1.19	.38	.14	Swine manure	.60	.41	.13
Feathers	15.30			Timothy hay	1.25	.55	1.00
Fish scrap	2-7.50	1.5-6.00		Tobacco stalks	3.70	.65	4.50
Garbage	3.4-3.7	.1-1.47	2.25-4.25	Wheat straw	.50	.15	.60
Greensand		1-2	5.00	White clover (green)	.50	.20	.30
Hair	12-16			Wood ashes (unleached)		1-2	4-10
Hen manure	1.63	1.54	.85	Wool waste	5-6	2-4	1-3
Horse manure	.44	.17	.35				
Leather (ground)	10-12						
Lobster shells	4.60	3.52					
Milk	.50	.30	.18				
Oak leaves	.80	.35	.15				
Oats, grain	2.00	.80	.60				
Orange culls	.20	.13	.21				
Peanut shells	.80	.15	.50				

(From the *Encyclopedia of Organic Gardening*)

mixed with wood shavings on the one-acre market garden and compost made with kitchen scraps, cow manure and hay on the home garden. Last year the market garden got cow manure and hay; the year before, half an acre got seaweed and the other half got chicken manure and sawdust.

I try diligently to use different manure and vegetable matter blends each year so that different mixes of nutrients are put on the soil each year. This lessens the possibility of one nutrient building up to an unhealthy level, or one element being neglected. Basically, I feel that by rotating my crops and my fertilizers I can be more casual in my approach. I may not be very scientific, but I am seldom disappointed with the results.

Actually, the soil test is of greatest value when I start working a new piece of land. I planted my first garden with no manure, lime or fertilizer of any kind. It was successful enough that I was encouraged to go on. The only failures were beets and spinach. I have learned since that they are not very tolerant of an acid soil. The soil test I had done the following spring indicated a pH of 5.3 and recommended 200 pounds of lime per 1,000 square feet. The soil also was low in potassium for which 750 pounds of granite dust were prescribed. (My experience with granite dust has led me to believe this is an unrealistically high amount.) Or I could have applied 100 pounds of lime and 72 pounds of wood ashes. Wood ashes are alkaline and would raise the pH as well as supply potassium.

If I had been spreading seaweed that year, further adjustment would have been necessary because seaweed is 5 percent potassium.

If you are interested in pursuing these numbers further, I suggest you get a copy of *The Encyclopedia of Organic Gardening* (Rodale Books, Emmaus, Pa.). Under the heading "Fertilizers," "Organic Materials," "Manure" and the individual listing for each nutrient, you will find percentage analyses for most organic materials you are likely to encounter. For those who want a simple answer to organic soil fertility, the following program should give satisfactory results:

1. *Spread one bulky organic material annually.* The soil should look well covered, but the material need not be more than an inch deep. A pickup truckload will cover 1,000 to 2,000 square feet when you are building up the soil and 3,000 square feet when you are maintaining a fertile soil.

2. *Correct the soil pH.* Use the recommendations on the soil test.

3. *Nitrogen.* If the bulky material is manure or seaweed, it will probably provide sufficient nitrogen. Wood chips or sawdust will require additional nitrogen which can be supplied using blood meal (15 to 20 pounds per 1,000 square feet) or cotton seed meal (35 to 50 pounds per 1,000 square feet).

4. *Phosphorus.* If a soil test indicates a soil low in phosphorus, spread 75 pounds of rock phosphate or 40 pounds of bone meal per 1,000 square feet. I prefer rock phosphate because it will last longer in the soil and is less expensive.

5. *Potassium.* If your soil tests low, use granite dust or greensand (about 250 pounds per 1,000 square feet) or wood ashes (70 pounds per 1,000 square feet). Wood ashes are water soluble and should be treated with care. They can harm plants or seeds if they come in contact with the roots. On the other hand, nutrients in ashes will leach out in the spring rains if spread during the winter. They are best spread just before turning the soil in the spring.

6. *Magnesium.* This nutrient is only needed in small amounts. A low reading can initially be corrected by using dolomitic limestone when correcting the pH. After that, the annual addition of a bulky organic material will probably maintain an acceptable level.

7. *Trace elements.* The beauty of organic gardening is that the trace elements will take care of themselves. This is especially true if you use a different bulky fertilizer each year, and rotate your crops so that no crop is ever looking for a nutrient in soil that was mined by a similar plant the year before.

I have my soil tested about once every three years. I obtain a form, instructions on taking the soil sample and a container for mailing the sample from the County Cooperative Extension Service. (You can get the address from the phone book.) I haven't altered my soil management since the first test because subsequent test results tell me my program is working fine. But I will continue the periodic testing because I like to know I'm still on the right road.

The plant's response to our soil is the most important consideration, and, fortunately, the soil has a tremendous capacity for correcting itself. Just as plants will do well over a range of pH readings between 6.0 and 6.8, there is a range of nutrient availability over which they can grow well. Most important, however, is the microbiological life in the soil. The organic material we put into the soil is what feeds microbiological life. These tiny organisms convert the organic material in the soil into nutrients for the plants, turning our imprecise testing and calculations into precisely the nutrients our garden plants need when they need them. □

THE NUMBERS GAME

WHAT DOES IT mean when your test indicates that your garden needs 50 pounds of 5-10-10? The first number indicates the fertilizer contains 5 percent nitrogen (N), the second is 10 percent phosphorus (P), and the third is 10 percent potassium (K). Fifty pounds of 5-10-10 translates to 2½ pounds N (5 percent of 50, or .05 × 50), 5 pounds of P (10 percent of 50, or .1 × 50) and 5 pounds of K (10 percent of 50, or .1 × 50).

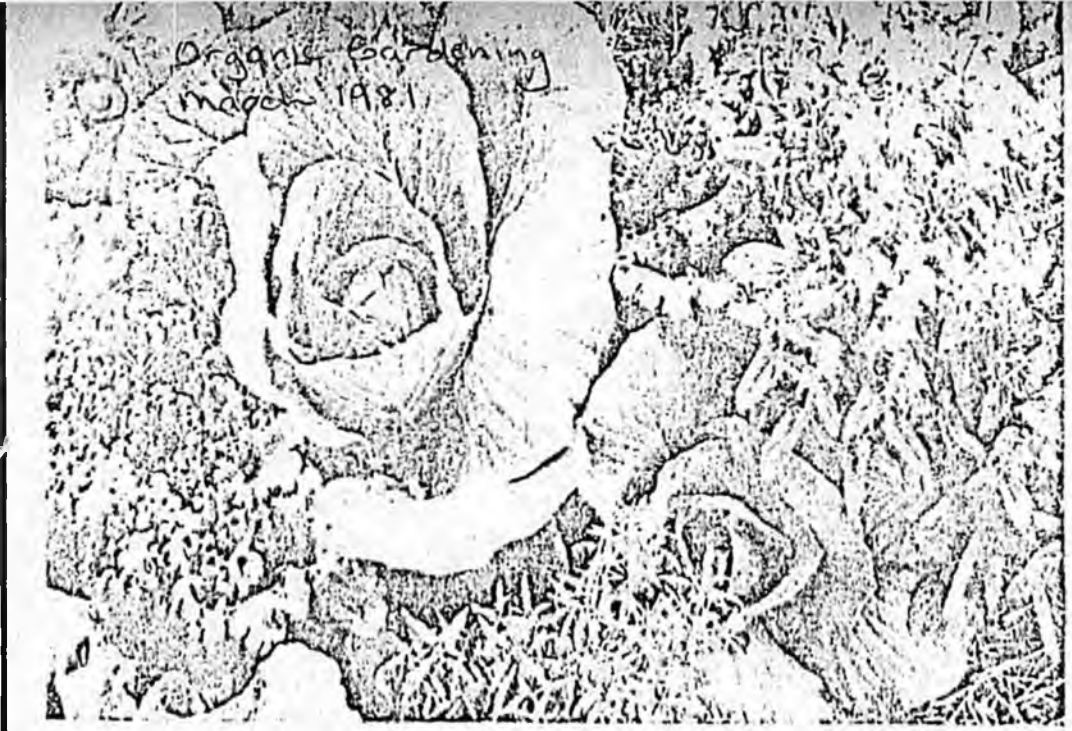
What about organic fertilizers? Horse manure is rated at .44-.17-.35. So to find the amount of horse manure needed to give you 2.5 pounds of nitrogen, divide 2.5 by .44 percent (2.5 ÷ .0044 = 568). The 568 pounds of horse manure will also give a little less than one pound of phosphate (568 × .0017) and two pounds of potassium (568 × .0035). You still need 4 pounds of phosphate and 3 pounds of potassium.

Let's get our potassium with wood ashes which are rated at 0-1.5-7. Three pounds divided by .07 is 43 pounds of wood ashes. You get an added bonus of about half a pound of phosphate.

Now you only need 3½ pounds of phosphorus. Rock phosphate might be rated at 0-20-0 with 4 percent available. The available figure means that 4 percent of the rock phosphate is water soluble. So if you need phosphorus that's immediately available, you should use 0-4-0 as your guide. Three-and-a-half pounds divided by .04 yields 87 pounds of rock phosphate to round out the fertilizer requirement.

As the soil test is merely a guide, so are the figures arrived at through these calculations. The ratings for various organic materials found in nature will vary from season to season, and climate to climate. Of course, the handling, age and water content will also make a difference.

— M. M.



Creating a Haven For Beneficial Insects

Interplanting your crops with weeds and herbs creates a complex environment that will lure helpful insects to the garden.

A tremendous diversity of plants is the key to keeping them in your garden.

MICHAEL LAFAVORE

IF YOU WANT some tips on how to plant your garden, take a walk through a wild meadow and see how Mother Nature plants hers. Does the vegetation grow in rows, each type of plant clustered in its appointed place? Not likely. In nature, a complex profusion of different plants grow together. Plants, animals and insects coexist, and the environment is fairly stable and balanced. No one species is allowed to reign. There are no pest or weed problems.

Nature keeps the populations of those insects we call pests in check by providing natural enemies, the ones known to us as beneficial insects. That's well understood. But few of us fully appreciate the vast number of potentially beneficial insects that inhabit the land around us. It's not only the handful we read about so frequently, but dozens, perhaps hundreds of kinds of insects. Some look like flies, some are smaller than a pinhead. Some come out only at night and others rove through the rubble on the ground searching out eggs and larvae.

You'll find many of the beneficial insects native to your region in Mother Nature's meadow, especially if the meadow is a complex landscape including the edge of a woods, a running brook and perhaps a bit of marsh. By comparison, how many of those insects are stalking in your garden? If you're growing strictly corn, beans and tomatoes in the midst of an acre or two of close-cropped grass, it will be only a few. If you have a multitude of flowers, fruiting trees and shrubs, and herbs along with your vegetables, perhaps near a rank and weedy hedgerow, you certainly will have more. The number will increase directly with the diversity of the planting you have created.

The mere presence of pests like aphids isn't enough to lure a range of predators to your garden and keep them there. Beneficial insects need more – they need their favored places to breed and most need other sources of food. Take, for example, the huge family of minuscule wasps that parasitize several kinds of pests, from aphids to Mexican bean beetles. The adults lay eggs on the body of the pest and when the larvae hatches out it consumes its host. The egg-laying adults need nectar for food to continue breeding, producing those valuable eggs and for seeking out the pests. They need other plants for rest and shelter. All these other essentials may be provided by trees for one species, flowers for another, or herbs or even lowly weeds.

One scientist who has done a lot of research on the positive role of weeds in garden ecology is Dr. Miguel Altieri, an assistant professor at the University of California's Division of Biological Control. One study he conducted in Florida proved that damage to corn by fall armyworms was higher in clean fields than in plots where the corn was interplanted with cocklebur, dandelion, evening primrose, goldenrod and other weeds. He cites numerous studies which show that interplanting vegetables with weeds can significantly lower pest damage. As far back as 1936, four

times more parasitized codling moths were counted in orchards that were uncultivated than in those that were clean. That's why Russians undersow their orchards with buckwheat, dill and mustard.

"A weed is simply a plant whose virtue has not yet been discovered," says Altieri. "When we plow down a field of weeds, we may be destroying a habitat for beneficial insects. We're chasing out all the good bugs and leaving the garden to the pests."

There are a number of theories as to why the presence of weeds has such an effect on pest populations. In addition to providing homes for beneficial insects, scientists believe that weeds may produce odors that confuse or repel pests. Their smell may also attract the beneficials. And there is some evidence that many pests find crops with their eyes. They actually see the plants highlighted against bare soil. Providing a border of weeds can camouflage the garden and keep the pests away. Weeds also serve as home for neutral insects, which can serve as alternate food for some predators.

Altieri and his colleagues aren't suggesting that we let weeds have their run in our gardens. But letting selected weeds grow in certain places can help to create a better ecological balance. Take goldenrod, for example. Most of us are tempted to yank up this weed as soon as it shows itself. But goldenrod supports more than 75 species of beneficial insects. And over 30 beneficial insects call the common pigweed home.

The approach Altieri advocates is for gardeners to allow weed strips to grow every ten rows or so, or to leave weeds in ditches or to let a weedy border grow up around the garden. Flowering weeds such as dandelion, wild carrot, lamb's-quarters, goldenrod and evening primrose seem to be particularly effective. Allow the weeds to grow until they begin to shade your vegetables, then cut them back to about one foot high.

Dr. Miguel Altieri (right) has found that weeds are home for many beneficial insects, including the Trichogramma wasp, a parasite that can cover a pest like the tomato hornworm with its eggs (below).

Red and white clover have also proven to be refuges for numerous beneficial insects. Altieri suggests growing two or three "islands" of clover near the garden, then mowing them one at a time over the season to force the insects from the clover into the garden.

Planting herbs in and around the garden can also help control insect pests. Mint, for example, is believed

BENEFICIAL COMPANION PLANT/INSECT INTERACTIONS

Companion Plants	Pests	Factors Involved
Grapes with blackberry, raspberry, and Johnson grass	Corn earworm, Bollworm, Pacific mite	Alternate prey for predators
Cotton with ragweed family and sour dock	Tomato fruitworm	Increase of predators
Cabbage with winter cress, horseradish, peppergrass and mustard family	Aphid	Increase of predators and parasites
Collards with ragweed	Yellow scale, Western striped flea beetle	Chemical interactions
Brussels sprouts with wild oats, knotweed, lamb's-quarters, cole, mustard and common nightshade	Cabbageworm, Aphid	Increase of predators and parasites
Brussels sprouts with corn spurry	Bean aphid	
Brussels sprouts with lamb's-quarters	Whitefly	
Brussels sprouts with knotweed	Armyworm	
Brussels sprouts with radish	Cabbageworm	
Beans with wire grass and goose grass	Leafhoppers	Chemical interactions
Cowpea with cotton	Boll weevil	Increase of parasitic wasps
Peaches with strawberries	Strawberry leafroller, Oriental fruit moth	Increase of parasites
Sorghum with cotton or corn	Corn earworm	Increase of predators due to an increase of alternate prey
Tomato with cabbage	Diamondback moth	Chemical repellency or masking
Corn with peanut	Corn borer	Increase of spiders
Tomato with cotton	Flea beetles	Chemical repellency
Cotton with sesame	Corn earworm, Bollworm, Tomato gauitworm	Increase of beneficial insects and attracts pests to alternate food

to repel cabbage butterflies, ants, black fleas and aphids. Rue, savory, basil, sage, lavender, thyme, garlic and tansy are also said to repel many pests. Most of these have flowers that are potentially valuable nectar sources for beneficials, too.

'WEED JUICE' TO HALT PEST DAMAGE

You don't have to grow weeds near the garden to get some of their beneficial effects. Studies at the University of Georgia found that when a blended mixture of wild amaranth leaves and water was sprayed on soybeans, it attracted a higher number of Trichogramma wasps, parasites of the corn earworm. Apparently the "weed juice" stimulated the wasps' appetites somehow and brought them to the soybean field. Similar results were obtained with the use of wild geranium leaves. And extracts of wire grass and red strangletop have been shown to be effective at reducing leafhopper populations. George Flynn, a Newton, New Jersey, gardener, found that a juice made from stalks and leaves of geranium repels striped cucumber beetles.

To make weed juice, blend one ounce of leaves or stems with one quart of warm water. Apply the spray to your crops immediately and repeat the procedure every two weeks.

Herb extracts can be sprayed on crops to repel insects, as well. In a test conducted at the Organic Gardening and Farming Research Center, eucalyptus extract sprayed on potato plants halved the number of Colorado potato beetles. A nasturtium spray was also found to be effective against the beetles.

INTERCROP BARRIERS

If you don't want to grow weeds or herbs right in the garden, simply intercropping your vegetables will hamper pests. Scientists have learned that insect pests tend to spread more easily and remain longer when crops are grown in pure stands. So alternate the rows of vegetables, making sure that one crop doesn't shade another. And disease can spread unchecked through entire sections of the garden if one kind of plant predominates there. But intercropping can check the spread of disease as well.

Your garden's location can also be a factor in pest control. By planting near the border of a forest or meadow, you can benefit from what's known as the "edge effect." That is, the numbers of beneficial insects are higher around the edges of these diverse environments. Tall weeds, trees and shrubs may also prevent some pests from being blown into the garden by the wind.

When we grow our highly domesticated vegetables in neat, weed-free rows, we are ignoring nature's model — in essence inviting insects and diseases to run epidemic in our gardens. What scientists like Altieri are learning is that there is another way. And they are beginning to develop models of how this new, better-balanced ecology can be created in our landscapes.

For the gardener, since no hard and fast recommendations have yet evolved, the keys to this new approach are observation and experimentation. Look at nature around you, and see what you can learn about the mixes of plants that thrive on their own and the societies of insects that operate among them. Then try to recreate some of these mixes, or similar ones in your garden. Begin experimenting in at least part of your plot. Mix it up, but the garden needn't be a jumble. Create islands in the garden and in the lawn. Convert part of the lawn to meadow. And develop borders that are a blend of both useful fruiting and flowering plants and some of those stately strangers you may have been calling weeds. □

ing up organic matter with humates, they feel they can reduce chemical application appreciably, sometimes as much as 50 percent. For the organicist, the humates may be advantageous as a source of trace elements—if your soil is deficient. Some humates have a high pH, some a low pH. Be sure to check this point before using. You don't want to put a conditioner with a high pH on land that is already alkaline.

Soil Amendments Made from Composted Tree Bark

In addition to mulches already discussed, there are a number of fairly new products on the market made from ground-up, composted tree bark, which can be used as mulch, conditioner, and fertilizer. The amendments are certainly organic and worth serious consideration where available. Tree bark is richer in nutrients than leaves or sawdust. It makes an excellent organic potting soil.

Some of the bark composts have other organic fertilizers mixed into them. Barsola (NOMCO, Watertown, N.Y.), for example, contains dried poultry manure and other fertilizing ingredients. Other products contain bark only, such as Bambé (North Stratford, N.H.) which is composted from pure hardwood barks.

Other Dried, Processed Organic Fertilizers

As the price of chemical fertilizers rises, organic plant food, which has always cost more, may become more competitive. This trend should encourage the production and marketing of more organic fertilizers as convenient as Bovung and other dried manures like

Chic Green (3-4-2 analysis), or Milorganite (6-3-0) and other processed sludges.[28] I just discovered "F & B's All and Only 100% Natural Organic Garden Food" (Faesy & Beshoff, Inc., Edgewater, N.J. 07020). Sounds like a title of a Tom Wolfe short story. All and Only 100% Natural Organic Garden Food is a blend of bone meal, dried blood, cottonseed meal and cottonseed hull ashes, with an analysis of 5-5-5. Shur-Gro is another all-organic fertilizer (Canton Mills, Inc., Minnesota City, Mn. 55959) sold widely in labelled analyses—a 10-6-4, a 4-2-10, and others.

For the house plant grower, fish emulsion fertilizers offer another convenient way to get organic nitrogen, if not other nutrients. For instance, Atlas Fish Emulsion Fertilizer (Renton, Wis.), which I just noticed in a garden store, carries a guaranteed analysis of 5-1-1 and costs $1.69 a pint. But that's undiluted and must be mixed with water before using. Another source of nitrogen you can buy from the better organic supply stores is Agrinite, which is about seven percent N. It's a mixture of leather dust and tankage. Some stores also carry guano with an analysis of 12-3-1.

Finally, there are what I call the "true" soil conditioners—products made solely for the purpose of improving the tilth or physical consistency of the soil with no claims of adding fertility. These products seem to come and go—about once every five years they make a big splash of publicity and then fade away for awhile. Krilium, highly touted in the 1950s but ignored today, is a good example. No fertility value was claimed for Krilium, only its capability to improve soil structure and control erosion. Some products are made to keep clay soils from crusting, others to increase water absorption properties of a soil, others to increase permeability. A soil well-managed with organic methods won't need any other conditioning.

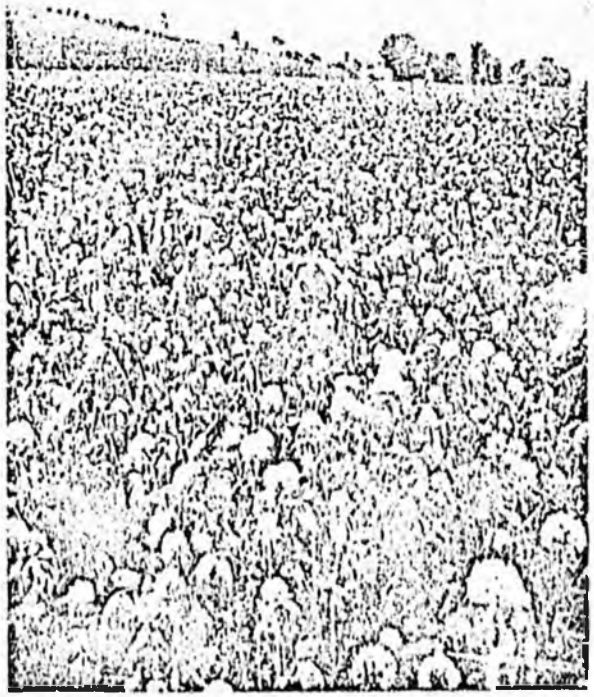
Chapter 12

Green Manure: Grow Your Own Fertilizer

Green manuring is a slightly old-fashioned term for the practice of growing certain grass and legume crops specifically for plowing, disking, or rotilling them into the soil to improve tilth and fertility. Widely practiced for centuries, green manuring fell into disuse among modern farmers when chemical fertilizers became cheap and easily available. Now that commercial fertilizers are expensive, with their supply tied to the here-today, gone-tomorrow availability of fossil fuels, scientists are reconsidering green manuring. If present green manure crops can use solar energy directly and at no cost to add that much fertility to the soil, maybe man can develop even better ones that will add more nutrients to soil than we dream possible right now. After all, the reserve of carbonates in the earth and atmosphere that plants can convert to carbohydrates by photosynthesis is almost inexhaustible. Just as significantly, there is an equally

inexhaustible supply of nitrogen in the atmosphere that legumes can draw on to convert to plant nitrogen in the soil for the all-important process of protein synthesis. All man has to do is grow the green manure crop and stand back and watch.

Organic gardeners and farmers have always relied on green manures for increasing fertility, especially on larger gardens and fields where heavy mulching and composting would be impractical. But green manuring can be adapted to any size operation. It's the least-labor way to add organic matter and also the easiest way to provide a vegetative shield over the land during winter to pre-



The clovers are among the best green manure crops you can grow. And there's a clover suitable for most every region. The gardener can turn in the whole crop for enormous benefits in soil fertility. The homesteader can remove several hay crops before turning in the clover for the same fertility benefits.

vent erosion. That's why green manures are often referred to as "cover crops."

Besides those advantages, each of the two kinds of green manures, nonlegumes and legumes, has its own particular advantages. Nonlegume cover crops, mostly grasses, are used for short-term production of organic matter. For instance, rye is sown in the fall and plowed under the following spring. In this way, land is not tied up with the green manure crop during the growing season. Also, the grass growing in the fall can "consume" and "store" in its fibers the available nitrogen in the soil which might otherwise leach out over winter.[2]

Legumes: The Best Green Manures

But legumes, and particularly the clovers, have far more advantages and are preferred for green manure whenever they can be used (by clovers, I mean alfalfa and sweet clover in addition to the true clovers: red clover, white clover, alsike clover, crimson clover, and the others). Here's why.

1. Clovers are good "foragers" and will find moisture and food where many other plants languish.
2. Clover roots grow deep into the soil and bring up minerals to the surface where other plants can use them.
3. Because of this root vigor, clover aerates the soil and improves drainage.
4. In built-up soil, clovers grow well enough to provide a crop of hay and still have second growth for a good green manure crop.
5. Beneficial teas can be made from clovers, not to mention sprouts from the

seeds—especially alfalfa seeds.

6. Clovers, particularly the white clover, are one of the best sources of nectar from which bees make honey.
7. Clovers insure rotation of crops in garden and field. This point is particularly important to gardeners who do not want to use pesticides. By taking a small part of the garden out of production of vegetables, fruits, and grains each year on a rotating basis, you are more apt to avoid build-up of insects and fungal diseases.
8. Clover breaks down readily in the soil, its nutrients becoming available to other plants quickly.
9. Best of all, clovers have the ability, already mentioned, to convert nitrogen in the air into nitrogen for plants. Actually, it is bacteria in the soil that make the conversion, but the legume plant is a necessary step in the process. When the bacteria come into contact with the clover roots, they enter the root hairs where they form tiny nodules. The biggest nodules I've ever found on clover roots were about ⅛ inch in diameter. As the bacteria feed the plant nitrogen, they receive other food from the plant and multiply rapidly. The symbiotic relationship produces an excess of nitrogen. It is this biologically "fixed" nitrogen, as scientists call it, which can be part of the answer to the problem of nitrogen fertilizer shortage.

(To take best advantage of this ability of legumes, the seed should be inoculated before planting, as explained under "Bac-

terial Inoculants" in the previous chapter. The person that sells you the seed can sell you the proper inoculant.)

How much nitrogen can a clover crop "fix" in the soil for subsequent crops? Science doesn't know yet what the limits might be. What we know for sure is that a good clover crop turned into the ground just before bloom stage can add at least 150 pounds of actual nitrogen to the soil per acre—that's equivalent to about five tons of manure. Alfalfa will fix 175 to 225 pounds of nitrogen per acre, according to tests at the University of Kentucky.

A clover hay crop that yields three tons of dry hay per acre returns to the soil, if plowed under, over 100 pounds of potash per acre, sixty pounds of phosphorus, and 100 pounds of nitrogen. I. P. Roberts, in a book written nearly a century ago, called *Fertility of the Land*, asserted that a garden should be sown on August 1 to clover instead of being allowed to grow up in weeds. By November 1, he reported, the clover would contain over 100 pounds of nitrogen in tops and roots. Not all that nitrogen would be available in the spring, but the figure is quite astounding when you remember that a 100 pound sack of chemical fertilizer containing ten pounds of actual nitrogen has been selling recently for eight to ten dollars.

The only difficulty in using clover to improve soil fertility is that you may have a problem getting a good stand when you plant it on poor land. Sort of a Catch 22—you need the clover to improve the land and you need to improve the land to get the clover! But if you have followed the advice thus far given in the book—drained your soil and limed it well—you should have little trouble. Most clovers will grow promptly if soil is not wet and not acid. On a garden that has grown vegetables satisfactorily, you should be in good shape.

Starting a Green Manure Program

To start a green manuring program, you first should develop a rotation plan for your garden in order to have a portion of the garden in clover every fourth year. If you can divide the garden into four equal parts you can establish a four year rotation that is fairly easy to follow: two years vegetables, one year grain, one year clover. Or two years vegetables, one year strawberries, one year clover. Or one year vegetables, one year strawberries, one year small grain, one year clover. Or three years vegetables, one year clover. Any of these combinations will work.

Why grain in the garden, you might ask. Simply because, as more gardeners are finding out, growing wheat (or rye, barley, or even oats) in the garden is an easy and practical way to get your own organic, whole-grain flour for wholesome bread and breakfast foods. You can grind it in your blender. What's more, wheat makes an excellent "nurse crop" for the clover. The wheat is sown in the fall and the clover is planted in it in early spring. The wheat is harvested that summer and the clover grows vigorously afterwards. The nurse crop is not necessary to the establishment of the clover, but as farmers learned long ago, it is more economical—you get a cash grain crop from the land while the clover is growing.

Many clovers can also be planted in August if moisture is adequate. You can tear up an old strawberry patch in July, rotary-till it once or twice and, after a rain soaks the ground in early August (hopefully), plant. For many gardeners that rotation—strawberries to clover to two years of vegetables—may be more suitable and certainly just as economical as the wheat to clover to two years of vegetables rotation.

Organic Gardening, March 1981

(55)

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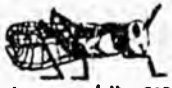

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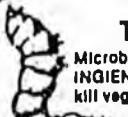

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From: The Mother Earth News
Special Issue #18
November 1972

THE PLOWBOY INTERVIEW

RAM BUX SINGH

It is now quite apparent that the days of unlimited and constantly increasing consumption of fossil fuels are "all over but the shoutin' ".

We maul and tear whole states with monster shovels, feed the coal we uncover to voracious power plants that belch out sun-darkening clouds of pollution, distribute the electricity that results through thousands of miles of ugly pylons and cables . . . and still watch our cancerous cities suffer an increasing number of "brown outs" and complete power failures each year.

Even the major oil companies (which have a vested interest in making us believe that the wild ride can go on and on) now ration their dwindling stocks of natural gas and predict that the world's reserves of petroleum will be exhausted in 30 to 50 years.

Clearly, something must be done . . . and most concerned environmentalists find it difficult to believe that the "something" is the development of nuclear power. At least not as long as the AEC stupidly continues to promote the fission process with its built-in dangers of runaway reactors, thermal and radioactive pollution. And fusion? Well, yes . . . maybe. But that approach to the controlled and sustained harnessing of nuclear energy is still only a dream.

Damn it, what we (and the planet) really need—first and foremost—is less *instead of* more: *less human population and less per-capita consumption of power and the things we manufacture with it. Secondly—and just as important—we must instigate an immediate crash program of research into ways of utilizing solar, wind, water, wave and other natural sources of the energy we do use. And that research must be relentlessly directed away from the development of centralized, capital-heavy, tightly controlled, "dirty" energy systems . . . and toward the nurturing of decentralized, inexpensive, controlled-by-individuals-at-point-of-use, "clean" power sources.*

It's a tall order but, luckily, some good men have accepted the challenge. A few have even successfully demonstrated alternative sources of energy that both satisfy all the stringent requirements laid down in the paragraph above . . . and *work. One of those men is Ram Bux Singh.*

For almost 18 years, Ram Bux Singh has directed experiments at the Gobar ("gobar" is Hindi for "cow dung") Gas Research Station at Ajitmal in northern India. His primary responsibility there has been the development of low-cost and simplified digesters designed to convert plant and animal waste into composted fertilizer and methane for fuel.

In the course of his work, Singh has personally overseen the construction of at least 200 "bio-gas" digesters and has become possibly the planet's foremost authority on the construction of village and farm-sized waste processing units.

Ram Bux Singh's fame spread to this country only recently when a few dedicated ecology enthusiasts began combing the

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world's literature for information about natural and non-polluting power sources. Eventually they discovered Singh's work with village and farm-generated methane--which is as natural and non-polluting as a compost pile--and called it to the attention of such U.S. publications as the WHOLE EARTH CATALOG and THE MOTHER EARTH NEWS. As a result of articles appearing in those periodicals, Mr. Singh now receives as many as 10 letters a day from the United States... all asking for more information about his experiments.

Thanks, in part, to his correspondence with individuals, government officials and universities in this country, Ram Bux Singh has developed a keen interest in helping to design, construct and promote the use of bio-gas plants here in the United States. "Two billion tons of manure is wasted annually in the U.S.," he says, "and that is actual food and actual power that you could save with the inexpensive composters we have developed in India."

When MOTHER learned that Mr. Singh was visiting this country last summer, she immedia ely invited him to her Madison, Ohio location to direct so ne of her people in the construction of a homestead-size bio-gas plant. MOTHER's staff found Ram Bux Singh to be an intelligent, alert, highly personable and extremely capable gentleman and they enjoyed his visit immensely. Mr. Singh speaks four languages--Hindi, English, Urdu and Persian--and (lucky for MOTHER) the following interview was conducted in English shortly after THE MOTHER EARTH NEWS' prototype methane generator was completed.

PLOWBOY: Ram Bux Singh, thanks largely to the WHOLE EARTH CATALOG and THE MOTHER EARTH NEWS, your efforts to convert manure and other natural wastes into methane have become fairly well known here in the United States. Did you originate the idea of producing non-polluting fuel from such sources?

RAM BUX SINGH: Oh no. The idea of taking out the gas from farm waste, vegetable waste--even human excreta--is very old and was demonstrated at an exhibition in London in 1871. In 1905 a very large plant designed to produce both gas and good fertilizer from waste was installed in Bombay, India. Then, during World War Two due to the shortage of conventional fuels, the Germans built many bio-gas plants for both the fertilizer and the methane that the digesters would make. They compressed the gas and used it for driving tractors and farm machinery. The idea is not a new one.

Today--in Algeria, in South Africa, in Korea, in France, in Hungary and in many other countries--thousands of bio-gas plants are in use. The idea does not belong to me or to the government of India.

PLOWBOY: But you have been experimenting with methane conversion for some time and your work in the field is considered quite important by scientists and technicians all over the world. Obviously you've contributed something of value to the search for ways to recycle waste into non-polluting fuel.

RAM BUX SINGH: Yes, I have worked on this problem for some time. In 1955, the government of India appointed me to simplify the construction of bio-gas plants. There was no question that such units would produce methane but, up to that time, most gas generators were very large and costly. Even the small plants built in Germany during the war were quite expensive. So what we have done at the Gobar Gas Research Station in India is to simplify the construction of bio-gas generators. We have designed efficient plants that are small enough for a single village or one farmer to build and we have found ways to construct these gas generators for very little money. We have made the bio-gas plant economical for small farms.

Let me give you an example of what we have done. When I recently visited a sewage plant at Charleston, West Virginia, the engineer there told me that seventy million dollars had been spent on the facility. If we were to try to scale down to village or farm size the technology used in that plant, the smaller waste disposal unit might still cost half a million dollars. Now, no village in India and no farmer--even in the United States--is going to spend a half million dollars to process waste. But we have designed bio-gas plants which both purify waste and produce non-polluting fuel . . . and some of these units can be b as little as $100! With our designs and a relatively mino tment, then, a farmer or small group of people can now construct a self-contained system that will recycle plant and animal waste into high-quality fertilizer and non-polluting fuel. The fuel can then be used to cook with, to heat the farmhouse and to power machinery. A bio-gas plant can make a farm more self-contained and independent.

PLOWBOY: In other words, while the radicals *talk* about it, you're *really* bringing power to the people!

RAM BUX SINGH: Yes.

PLOWBOY: It's this idea of homemade power, you know, that has excited so many people in this country. The idea of running a car or heating a house with non-polluting fuel that is generated from waste right in one's own back yard is tremendously attractive to individuals fed up with oil spills, strip mining and smog. Yet I notice that you emphasize the fertilizer produced by a bio-gas plant just as much as you emphasize the methane which comes from such a unit.

RAM BUX SINGH: Oh yes. The fertilizer is very important, especially in a country like India where the farmers do not have so much money with which to buy chemical plant foods. You are rich enough here to purchase the commercial fertilizers and you do not think so much of conserving the natural nutrients for your crops. But I believe you will. As your population increases and you farm more intensively and the movement to cooperate with nature gains strength in the United States, I believe you will think more and more about conserving your natural plant foods. You will begin to think more and more of the bio-gas plant as a source of both power *and* high-quality fertilizer.

PLOWBOY: What do you mean by "high-quality"?

RAM BUX SINGH: We have calculated through many university lab tests in India that the fertilizer which comes from a bio-gas plant contains three times more nitrogen than the best compost made through open air digestion. If you compost chicken manure, for example, the finished compost will have in it only 1.58 to 2% nitrogen. The same manure digested in a bio-gas plant will analyze 6% nitrogen.

PLOWBOY: Where does this extra nitrogen come from?

RAM BUX SINGH: It is already in the manure. The nitrogen is preserved when waste is digested in an enclosed bio-gas plant, whereas the same nitrogen evaporates away as ammonia during open air composting. The bio-gas plant does not make extra nitrogen, it does not create nitrogen . . . it merely preserves the nitrogen that is already there.

PLOWBOY: OK. I can see how the nitrogen is caught and contained when plant and animal waste is digested inside a closed bio-gas plant, but what about other elements? Is anything lost or eaten up by the bacteria in the tank? Do they take anything out of the organic material so that, over a period of years, you'll be putting back less and less on the fields you fertilize with waste processed in a bio-gas plant?

RAM BUX SINGH: No, nothing is used up. This is the perfect fertilizer-making machine and it has been tested all over the world. There is no better way to digest or compost manure and other organic material than in a bio-gas plant. I think you can compare the bacteria in a digester tank to fish worms. Fish worms help the soil by eating organic matter, passing it through their bodies and expelling it as very rich fertilizer. They live by breaking waste material down into food for plants. It is the same with the bacteria in a methane digester.

PLOWBOY: Yes, that's a good example.

RAM BUX SINGH: You may also think of it another way. Seven cubic feet of methane gas can be generated from one pound of dry leaves but only one cubic foot of gas will come from one pound of cow dung. The cow dung, on the other hand, is just that much richer a fertilizer than the leaves. You can say, then, that the cow has digested the leaves and partly turned them into plant food. When the cow manure is then composted in a bio-gas plant, the bacteria there merely further process—or refine—the former dry leaves into a still richer plant food. It is all very natural.

PLOWBOY: We've heard much about your experiments with cow manure at the Gobar Gas Research Station in India. Have you successfully processed other kinds of waste?

RAM BUX SINGH: Yes, we have experimented with many types of digesters in India and our most successful work has been with chicken manure. Chicken droppings are easily digested, produce large quantities of methane and—when processed—make a fertilizer with a very high nitrogen content.

PLOWBOY: What about human waste?

RAM BUX SINGH: Human excreta is very rich and should produce much gas and very good fertilizer. The two or three plants we have set up for processing this waste have not been successful, however, because of the modern flush toilet. There is just too much water with the excreta . . . too much liquid for the digesters to handle. If we could separate the water from the human waste, though, I think we would find our own excreta to be the very best of all for recycling into fuel and fertilizer.

PLOWBOY: Over and above our excreta—our personal waste—have you experimented with human waste in general? Have you built a plant to handle all the garbage and waste paper and other sewage that people generate every day?

RAM BUX SINGH: Yes, we have built plants of that type . . . sewage plants with the primary purpose of—*not* to make the gas and *not* to make the fertilizer—but to keep the city environmentally fit. We have done this in many cities in India. The biggest of these installations is in Delhi. There, four 400-horsepower engines are running on the methane from the plant and those engines drive generators which produce electricity. The fertilizer from the sewage plant is given to the farmers in the area.

There is one difficulty also with these installations however, and that is the high percentage of paper and related materials that people discard. This waste is not rich enough in nitrogen and it does not produce a great deal of methane nor does it make the best fertilizer. Too, just like the excreta, this material is usually accompanied by far too much water and it is difficult to digest.

PLOWBOY: You say that the ordinary sewage from a city is not rich enough in nitrogen for best digestion in a bio-gas plant. Isn't there anything you can do about that?

RAM BUX SINGH: Yes, of course. You can seed the mixture —before it goes into the plant—with nitrogen. Let me explain:

The anaerobic bacteria that do all the work in a bio-gas plant consume carbon about 30 times faster than they use nitrogen. They work most efficiently, then, when the waste fed to them has that balance. When the carbon is 30 parts and the nitrogen is one part, the material put into a bio-gas plant will digest very rapidly and will produce much gas and good fertilizer. Results will not be as good when the carbon-nitrogen proportions are anything else.

For instance, sawdust has no nitrogen at all. Simply carbon is there. If you put nothing but sawdust into a bio-gas plant, it will not digest even in 200 days. But if you add enough nitrogen—either naturally, in the form of manure, or chemically—to make a 30-to-1 working ratio, the bacteria will rapidly process the mixture into methane and fertilizer.

PLOWBOY: So, for best results, you must analyze the material you put into a bio-gas plant?

RAM BUX SINGH: Exactly. You cannot guess. Many people have written to me that they have installed a plant of a certain size and filled it with so many leaves and so much of this and that . . . and the unit does not produce gas. It does not digest the material. I write back and tell them that they have not calculated the ratio of carbon to nitrogen in the material. When you load a digester with grass, leaves and other high-carbon waste, you must also mix in enough nitrogen to make the material ferment.

In the beginning, if you do not know how much carbon or nitrogen is in the different materials you have to process, you can send samples to the nearest university lab or county agent and have the grass and straw and other matter analyzed. After that, you'll soon learn to judge the percentages.

PLOWBOY: And from then on, it's just a simple chemical reaction.

RAM BUX SINGH: A very, very simple reaction. When a bio-gas digester is properly built, loaded with the correct mixture of carbon and nitrogen and held at the appropriate temperature, there is no difficulty at all. There is no way you can make it *not* work.

PLOWBOY: What is that "appropriate temperature" you've just mentioned?

RAM BUX SINGH: When a digester loaded with the proper carbon-nitrogen mixture is maintained at 90 to 95° Fahrenheit, in 40 days the material will produce 95% of the gas it is capable of producing.

PLOWBOY: And if you maintain the digester and its contents at, say, 110°F?

RAM BUX SINGH: Yes, you can use 110° . . . even up to 118°F. Above 110, however, much gas will come but the production is not easy to maintain . . . and above 118°, the bacteria will die.

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PLOWBOY: Let's say you do use 110°F. What will the digestion time be then?

RAM BUX SINGH: It would come down to about 28 days at that temperature.

PLOWBOY: And how far can we go in the direction of minimum operating temperature?

RAM BUX SINGH: First-class digestion takes place between 90 and 100°F. Between 75 and 90°, a bio-gas plant works . . . but not nearly so well. At 60 to 75°, there is digestion but only very slow production of methane . . . and below 50 or 60°, the whole process is arrested.

PLOWBOY: OK, now. You've just said that a bio-gas plant loaded with a 30-to-1 mixture of carbon and nitrogen will, when held at a temperature of 90 to 95°F, produce 95% of the gas that the waste is capable of generating . . . and will do it in 40 days.

RAM BUX SINGH: Yes.

PLOWBOY: Which brings up the point that—once a definite length of time is established for the digestion of material in a bio-gas plant—the unit can then be operated in either of two ways.

RAM BUX SINGH: Yes. We have designed some bio-gas plants for what we call "batch feeding" and some for "continuous feeding". We can even switch some of our units back and forth from one method of operation to the other.

For the batch cycle, a bio-gas tank is opened and filled with the waste material to be processed. The digester is then sealed and the methane gas collected as the matter inside decomposes. After 40 days, the tank is again opened and the composted fertilizer is taken out. The digester is then filled again and resealed for another cycle. Actually, the tank does not have to be opened if it is designed properly. Instead, with the proper inlet and outlet pipes and a pump, the waste—in slurry form—can be pumped in and out.

With the continuous feeding method, a bio-gas plant is filled once. Then, as the bacteria inside begin to change the waste into methane and fertilizer, new and undigested matter in the amount of one-fortieth of the volume of the tank is added each day. If the digester is properly designed, the digested one-fortieth of the material in the tank will be forced out as the fresh waste is piped in. In this way, new material is constantly added to the mass in the bio-gas plant and spent matter is constantly expelled. The unit, then, steadily consumes waste and just as steadily produces methane and fertilizer.

PLOWBOY: But how do you make such a digester operate so efficiently? How do you make sure that only digested material is forced out as you pump in the fresh matter to be processed?

RAM BUX SINGH: It is very simple. Unprocessed waste is heavy. As the bacteria digest it, the matter becomes lighter and lighter. Merely by positioning the inlet pipe in the bottom of the tank and by placing the outlet at the top of the mass, we use this natural principle to our advantage. The tank can hold only so much and—as we force a small amount of new material into the bottom of the digester every day—a corresponding amount of processed matter is forced to overflow through the outlet.

PLOWBOY: Very clever and very interesting!

RAM BUX SINGH: Yes, and we have taken that idea one step further in our more complex bio-gas digesters. Because we have found, you see, that a really big plant works more efficiently on a 60-day cycle and we have also learned that the material in such a tank gets lighter during its first 30 days of digestion and again heavier during the last 30 days. So we build those big bio-gas plants with both inlet and outlet near the bottom and separated by a wall that goes all the way across the tank.

We operate such a plant by filling the first half once and then, when digestion begins, we pump in fresh material . . . one-sixtieth of the digesting mass' volume. As we force this fresh matter in at the bottom of the first half of the tank, the partly digested material on top flows over the wall into the second section of the plant. There, the waste slowly sinks as its processing is completed until, finally, the completely digested material is forced out the outlet pipe in the bottom of that second half of the tank.

With such a system, approximately 80% of the methane produced comes from the first half of the digester and 20% comes from the second section.

PLOWBOY: Yes, and I see here in some of your drawings of those bigger bio-gas plants that you call for rather complicated and expensive-looking heating coils and agitators out in the middle of the tanks.

RAM BUX SINGH: Such mechanisms are necessary in the larger plants. The manure and waste being processed must be warmed and stirred uniformly so that it will all digest at the proper rate.

PLOWBOY: But the small bio-gas plant you've designed for THE MOTHER EARTH NEWS doesn't have any heating coils or agitators in it.

RAM BUX SINGH: No. They are not necessary in such a little digester. When the jacket around the holding tank is filled with hot water, the material in the main tank will be warmed quite well all the way through. In the same way, this digester is small enough that merely pumping the waste matter in and out of the main chamber will sufficiently agitate the fermenting mass.

PLOWBOY: At that, I understand that MOTHER's bio-gas plant is somewhat more complicated than most of the homestead-sized digesters you install in India.

RAM BUX SINGH: Yes. In India, where it is warmer, there is no need to put a water jacket around the main tank and there is no need to wrap a bio-gas plant in insulation. This digester, however, has the additional features because it is expressly designed for the colder climate you have here in the northern United States. The additions make it both more complicated and expensive to build than most small bio-gas plants constructed in India.

PLOWBOY: I think you've told some of the people who helped build this plant for MOTHER that it can be operated several ways.

RAM BUX SINGH: It is a batch feed digester but it can also be operated on a daily-feed, a weekly-feed and on a 15-day-feed cycle. We have designed this bio-gas plant to work in many ways so that you may learn about our ideas and report on them in THE MOTHER EARTH NEWS. There is much interest in methane gas production in the United States but, so far, there have been hardly any bio-gas systems built here.

We wanted this one to provide you with as much information as possible.

PLOWBOY: As I understand it, you're setting up THE MOTHER EARTH NEWS digester with a water jacket in which heated water will be circulated to keep the main tank at its optimum temperature of 90-95°F. The design also calls for a heavy duty mud pump—run by a two horsepower electric motor—to force the waste material into the bio-gas plant, to circulate the matter as it ferments there and to push the digested material out of the tank.

RAM BUX SINGH: Yes, that is correct.

PLOWBOY: Well, it's going to take some energy to heat that water and run the pump. Will the methane generated in the plant be worth it?

RAM BUX SINGH: Oh, yes. Each month, this plant should make about 6,000 cubic feet of methane. The digesting material needs to be stirred only 20 minutes a day or a total each month of about 10 hours. Since a gasoline engine consumes 18 cubic feet of methane per horsepower per hour, the two-horsepower engine necessary to drive this bio-gas installation's pump will use about 360 cubic feet of the gas each month. If we were to fuel the hot water heater with methane, we would find that the gas it consumes would be much less than this . . . we could even cut that further by warming the water jacket with waste heat from the engine. In all, we should net more than 5,000 cubic feet of methane and much valuable fertilizer from this plant every month. A generator like this one should pay for its initial investment in three years.

PLOWBOY: And just how good will this methane be?

RAM BUX SINGH: In India, when we process cow dung in a bio-gas plant, the methane that results tests about 650 BTU per cubic foot. I think it will be higher in this country because you feed your cattle so much grain. I think it will be also higher here in the United States because your cow manure from the barn is already in a slurry and contains the urine, whereas—in India—the cow dung we use is dry.

PLOWBOY: Well, let's just say that we do as well as you do in India. Let's say we generate methane with a value of only 650 BTU per cubic foot. How does that compare to the natural gas that is piped out of the ground for heating, cooking and industrial use?

RAM BUX SINGH: Natural gas, in this country, is about 1100 to 1200 BTU per cubic foot.

PLOWBOY: So the methane from a bio-gas plant is only about half as efficient as the natural gas we buy.

RAM BUX SINGH: Yes, but that is not bad. In England, for example, they take a low-grade coal and process it into coal gas which is then piped into factories and homes as fuel. This coal gas is a very important source of power in England at this time, yet it only has a BTU rating of 450. The methane from a bio-gas plant, then, is one-and-one-half times more efficient than that.

But even this is not the important point. The important thing to remember is that, in England, they are going to the trouble to process the coal into gas with a BTU value of 450 . . . while, in this country, you are making really no effort to save and use the 650-BTU gas that is evaporating and going to waste on every farm.

PLOWBOY: Well, we're making the effort now . . . that's why we have you here!

RAM BUX SINGH: Yes.

PLOWBOY: Actually, it goes past even the methane and fertilizer we're wasting on the farms. I believe you're working on plans for a prefabbed bio-gas plant that can be installed in city houses.

RAM BUX SINGH: Yes. Much real and potential energy goes to waste even in the cities of the United States. There is all the garbage—the vegetable trimmings, the spoiled food, the leftovers—that most families have. There is the dung from pets and the human excreta. The grass clippings, the weeds and the leaves. All this can be composted into much usable methane and fertilizer.

There is also other waste that could be used to operate a bio-gas plant. For example, the average temperature of bath water is 150 to 180°F. Even after use, the water has a temperature of 110° and, in the United States, you use about four to six cubic feet of this water per person per day. If you were to run this spent water into the jacket of a digester, it would warm the bio-gas plant to its optimum operating temperature and keep it there at absolutely no cost.

PLOWBOY: But what if everyone takes their bath in the morning or only once every two or three days?

RAM BUX SINGH: It makes no difference. If the bio-gas plant is properly insulated, it will need this hot water only once every 72 hours. The spent bath water alone is enough to heat the plant.

PLOWBOY: That makes a lot of sense. By recycling city wastes the way you suggest, we could go a long way toward making our lives more enjoyable while we preserve the planet's resources and drastically curb the way we pollute.

RAM BUX SINGH: Yes. That's why I would like to work with a factory in this country to develop and mass-produce a series of prefabbed digesters that people could buy and install and put into use quite easily. One of these bio-gas plants should be heavily insulated for your northern states and the other could be designed less expensively for your hotter climates. Both digesters should be available in two or three sizes. With only a little work, a manufacturer could develop a line of bio-gas plants that would sell quite well in this country. If any factory owner wants to manufacture these plants, I will work with him and help him to do it.

PLOWBOY: And in the meantime?

RAM BUX SINGH: In the meantime, I am getting five, six, seven . . . even ten letters a day in India sent to me from the United States. These are letters from people who want to know how to build and operate a bio-gas plant . . . from people who want to buy my books on the subject. I answer the letters and send the books, but it takes much of my time and the mail from India to here is often slow and the books are sometimes lost.

I would like it if soon a book written by me should be published by THE MOTHER EARTH NEWS. Then you can answer those letters and make the book available here and help the people in this country to learn about the bio-gas plants.

PLOWBOY: We'll publish that book, Ram Bux Singh, just as soon as we can. For the present, though, we'll have to be content to test the digester you've helped us build and to continue reporting on your work in our magazine.

RAM BUX SINGH: That is very good. Thank you.

PLOWBOY: And thank you, sir.

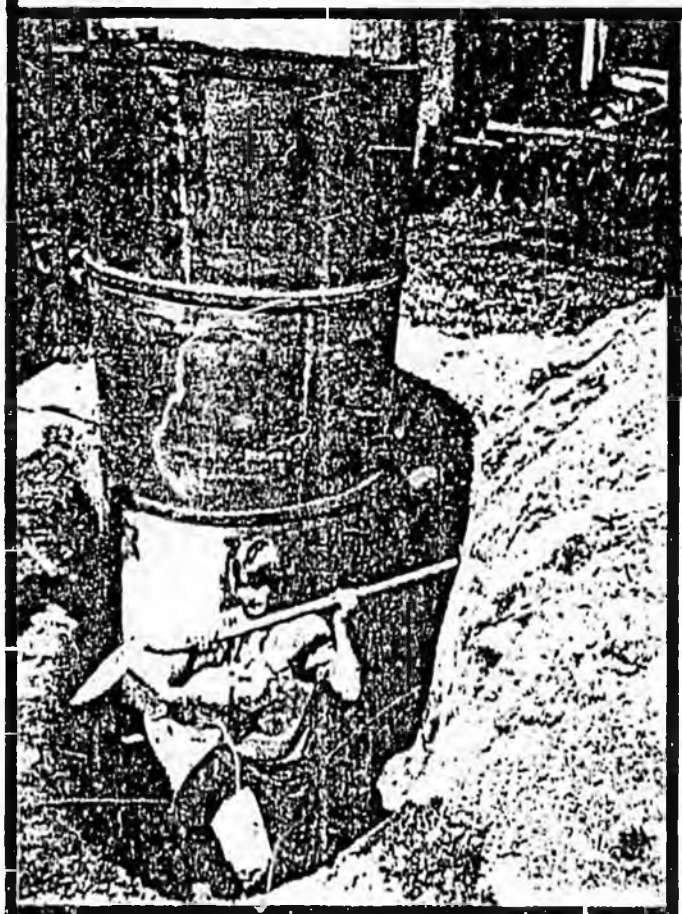
MOTHER'S METHANE MAKER

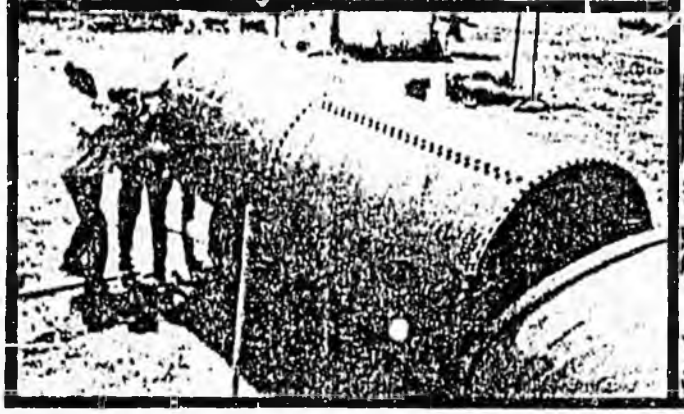
On the facing page you'll see a drawing and schematic of the bio-gas plant designed by Ram Bux Singh for THE MOTHER EARTH NEWS. A few photographs of the digester under construction are on this page. And how does it work?

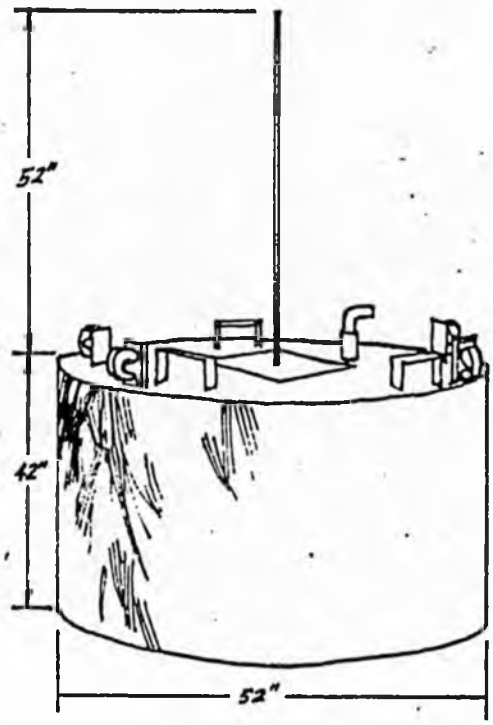
Well, sad to say, it doesn't work at all . . . yet.

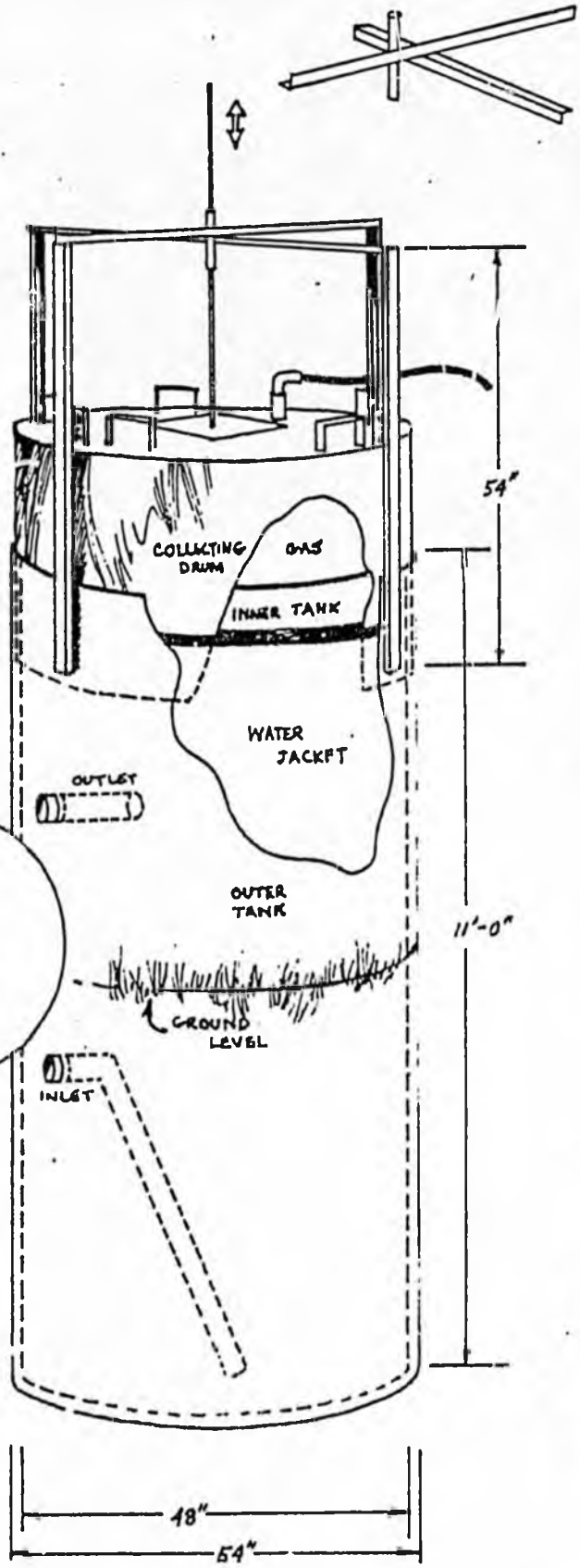
No, there's nothing wrong with Ram Bux Singh's design. What happened was that the guy who told us what a great welder he was and who did most of the welding on the blamed thing (we will mercifully refrain from bandying his name around) really screwed up the water jacket on our methane plant. The jacket leaks like the proverbial sieve and we can't fix it now without taking the whole blamed bio-gas plant apart.

Which we're gonna do . . . in the spring. Till then, hang on. At least we know that a digester really works, and that's all this plant had to prove anyway. We've already got several ideas for a new, improved model and—along about next summer—we should have some great plans and maybe even a prefabbed bio-gas plant to show you!

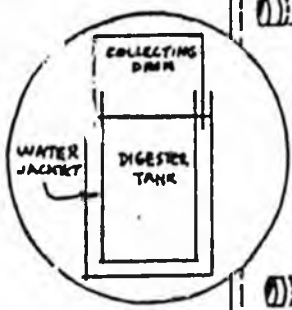


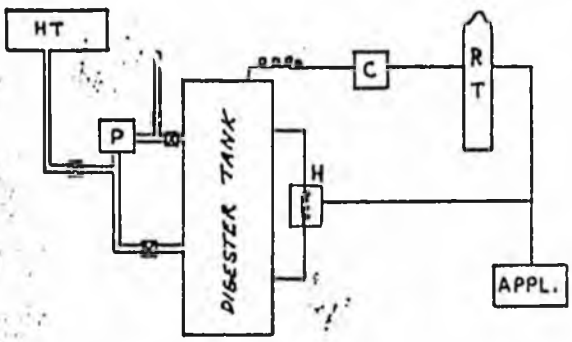






NOTE: When completely installed, this bio-gas plant will be insulated to the top of its water jacket. The insulation is not shown in this drawing, however, so that the tanks may be more fully illustrated.





HT ~ HOLDING TANK
P ~ PUMP
H ~ HEATER
C ~ COMPRESSOR
RT ~ RESERVE TANK
APPL. ~ HOUSEHOLD APPLIANCES

Lynn Rice
F-4 Cedar Park
Juneau, Alaska 99801

April 8, 1980

Governor Jay Hammond
Pouch A
Juneau, Alaska 99811

Dear Governor Hammond,

I am writing this letter in regards to the Delta Barley Project. There are several areas I am concerned about: these include application of chemical fertilizers on crops, application of pesticides and herbicides on crops; possible/potential radioactive waste migration and subsequent contamination of crops from Fort Greely's decommissioned nuclear reactor; the systemic destruction by clearing and burning of salvagable firewood; the potential of the soybean in the Delta Project.

I have read several of the reports on the Delta Barley Project. Estimated fertilizer requirements include phosphorus and nitrogen. Application of nitrogen can wash eventually into water systems and can overload and disrupt natural chemical cycling. Applications of phosphorus can have the effect of creating a jump in algae growth in water systems. This can 'smother' fish to death. Pesticides and herbicides contribute poisons to the environment and cause water pollution. I have expressed this concern in my letter of March 6, 1980.

* According to the Environmental Protection Agency pamphlet "Clean Water and Agriculture" (January 1977), the objectives of the 1972 Federal Water Pollution Control Act Amendments provides Federal/State programs to "prevent, reduce, and ultimately eliminate water pollution." EPA sites one source of nonpoint pollution as coming from agricultural runoff -"rain washing fertilizers and pesticides and topsoil into water." The following is in response to the question "How does the planning process work?": "Under Section 208, geographic areas with the most critical water quality problems are designated by the Governor for areawide Water Quality Management Planning. A responsible local government agency or regional organization is selected to carry out the planning process. For those areas of a State not designated, the State has this responsibility. All agricultural lands, whether in a designated or undesignated area, are included in the Water Quality Management process. This process includes the following: (1) Identification of water quality problems. (2) Identification of pollution sources. (3) Recommendation of guidelines for locally developed Best Management Practices to curb pollution from identified sources. (4) Recommendation of regulatory programs necessary. (5) Recommendation of State or local agencies needed to implement long-term Water Quality Management Programs."

I would like to suggest the use of organic farming methods and integrated pest management as a major part of this program to reduce and ultimately eliminate water pollution. (from farming)

Because a transfer from chemical farming to organic farming and integrated

I can't imagine any cost increase. Could use monies to build digester to produce free fertilizer, eliminate waste, and produce methane for farm equipment. 2.

pest management practices may cause a cost to the farmer for conversion, I would like to point out section 12 of the EPA pamphlet: "Will financial aid or cost sharing be available to assist farmers in establishing pollution abatement practices?" The response: "At the present time cost sharing is available through such programs as the Agricultural Conservation Program and the Great Plains Conservation Program of the U.S. Department of Agriculture. In June, 1976, the Small Business Administration enacted a loan program to assist farmers in implementing the control techniques necessary. A number of States and local governments also have cost-sharing programs." Can these cost sharing programs be used by Alaskan farmers to convert to organic and integrated pest management to reduce the polluting of Alaska's waters?

I have been thinking about recycling, alternative energy, and organic farming. I wonde: if a project-experiment could be conducted which relates to all three. This project would recover all organic waste (yard, household, industry). (fish waste, timber waste) It would be transported to a central location (or locations) to a bin-like set-up. Here the organic material would go through a composting process. In addition, the bin set-up would include a means to capture the methane gas which (I imagine) would be emitted. The methane gas is your alternative energy; the composted organic material is your soil enricher and alternative to chemical fertilizer. (Please note Playboy Interview)

My concern about nuclear waste migration was detailed in a carbon copy sent to you of a letter to Senator Gravel, January 16, 1980.

The process of clearing and burning in the Delta Project has brought about problems, specifically difficulties in containing the burning. I read in a report of the area the following: "Approximately 55,000 acres of the land proposed for clearing supports an open stand of black spruce and a thick moss cover... The remaining acreage supports smaller stands of mixed aspen and birch with scattered white spruce." The clearing area consists of 63,740 acres. 6,525 acres are designated for wildlife woodland, and recreation, 3,995 acres are designated for wind brakes, and 150 acres are in private holding. 53,070 acres is the total amount for tillage. Thus, it looks to me that 53,070 acres of black spruce, mixed aspen, birch, and white spruce are being systematically destroyed. In times of energy shortages, high oil prices for home heating, and an increased demand for wood for use in wood burning stoves and heaters, it is a shame to allow such waste. The wood should be available to the public, and then/or to any private companys wishing to retrieve the wood. Or a lease given to a company to cut and sell the wood for a profit. Or it could be a State project to cut, transport, and sell firewood to people in Fairbanks, Anchorage, and surrounding area. There used to be waste such as this by the Department of Transportation in Fairbanks when they cleared wooded areas for road construction. Now, cleared trees are left available for firewood cutting and collecting by any one who wants it before it is finally cleared away. Perhaps this could be carried a step beyond the Delta Project. Perhaps all government agencies involved in land clearing could be required to post and/or advertise that the wood is available to the public during a specific time period. This specific time period could be after work hours and on weekends during the cutting phase of the project.

In the publication Expanding Agriculture and the Management of Interior Alaska sources, by James Drew, director of Alaska Agriculture Experiment Station in Fairbanks, several purposes of the Delta Barley Project are enumerated. (could but not included) (letter)

* How about including a requirement to advertise in a newspaper(s) as part of a permit to burn/clear wooded areas. The advertisement could include a statement of exemption from liability in case of accidents

* Regarding marketing method of organically gro food products

1973

OGF Certification Program

Farmer identification and regional organic grower associations will be stressed more than ever as Rodale program goes into its third year.

JAMES FOOTE and JEROME GOLDSTEIN

FOR THE PAST TWO YEARS, Rodale Press has been operating a certification program for individual organic farmers. This Organic Farmers Certification Program began on a pilot basis in California under the direction of Floyd Allen, former West Coast Editor of OGF.

Farmers voluntarily participate by submitting an application and a procedures questionnaire which outline their particular growing methods. If the detailed answers are realistically consistent with our knowledge of the crop and the problems of the area, the farmer is accepted for certification, and visited by a Rodale Press editor. In addition, Rodale Press has retained Agri-Science Laboratories to do a series of soil and crop analyses as part of the pilot program, and also to obtain data on organically-grown foods.

The knowledge which we all have gained, thanks largely to the energy and talent of Floyd Allen, has been considerable and valuable. Specifically, we have learned that:

1. Organic farmers can be certified so that consumers can buy "organically-grown" with confidence;

2. Organic farmers can benefit economically while participating in a credible, well-managed certification program;

3. Problems of fraud and false labeling can be effectively combatted, and firm markets can be successfully developed in retail outlets (this is especially true where the certification program makes an impact on consumers and retailers and distributors of organically-grown foods);

4. Direct sales from organic farmers to consumers increase under a certification program that identifies growers;

5. Pesticide residues in foods grown by farmers using organic methods are considerably less than those grown by conventional commercial methods (see article, "Laboratory Results Verify Organic Farms" by Rudi Mattoni in November 1972 OGF);

6. Certification programs are best developed by organic farmers and persons directly associated with the distribution and consumption of their harvests, on a *grass-roots, regional basis*. These certification programs are *one* part of a *total* communications effort of a regional organization to encourage organic agriculture!

Our pilot certification program was a modest start, but its accomplishments have been real.

"Thanks to certification, I have more customers than I can take care of and am encouraging other growers in this area to take advantage of this," says Tony Owen of Elk River, California.

"Rodale Press truly gave the organic food business a shot-in-the-arm in establishing a certification program and thereby also placing considerable regulation within the industry," Pat and Dorothy Langan of the Northwest Organic Food Producers in Toppenish, Washington, wrote to Bob Rodale.

"Because of this certification program" writes Paul Hawken of Erewhon, Boston's Erewhon Foods distribution company, "many farmers were drawn into production. They felt that there was finally a reliable way of differentiation in the market. . . . I particularly welcomed the certification because it transcended brand names and took food back to its source. When there is no certification program, the customer has to rely on brand-name loyalty alone, and while that is not all bad, it has serious pitfalls for both the consumer and the marketing company."

But Hawken also stresses a concern for the future shared by so many of us. "The past two years have seen tremendous advances in the organic food movement in terms of public and official acceptance. At the same time, we have seen an influx of shoddy products and attacks from officials. These attacks up here in Massachusetts are increasing very rapidly. Without sounding apocalyptic, the organic food movement is at a crucial stage and it does not need any setbacks. It is a fragile thing indeed."

For 1973, the best way we can see to build up strength in the organic foods movement is to use our communications resources in Emmaus to work with and help develop organic food producer associations all over the U.S. Such groups now in existence are fulfilling the goals of farmers and consumers alike – without becoming dependent on any single commercial entity. Our plan is to work with newly-formed groups in similar ways as we have worked with such groups as the Maine Organic Foods Association, the Northwest (Washington) Organic Food Producers, the Rural Advancement Fund Co-ops, and the Piedmont (South Carolina) Organic Movement Association.

With each group, we can outline questionnaires and procedural methods. We can visit each one at least once a year to review those procedures. We will supply educational materials for growers and as much cultural advice as we can. To help in the marketplace, we will supply leaflets to encourage shoppers to buy foods grown by members of that association (where those foods are sold). And we'll regularly list those associations (like the listing which appears with this report) in OGF so readers can support the growers in these groups.

Developing such organizations is most important right now. When Charles Gould, extension agent in Maine, spoke at the East Coast Organic Farmers meeting last September, he stressed this point:

"It is necessary and very important that those involved in the marketing and growing of organic foods either form an organization or join one that is already in existence."

The Langans also make the same point:

"Naturally we feel that forming an Association of organic growers is the only way to go. We have gained considerable strength together and a better sense of direction. Even though we already had a good-size group of growers, only a couple of them were active. As an Association, our working force has increased, and we are accomplishing much more. . . . *It is important to us as well as to Rodale Press to aid any organic farmers to unite and form a viable organization in their area.* This is the beginning, and looking into the future of communication between these Associations and Rodale Press, we can see nothing but good things to come. We are very proud to be a part of it."

Pat and Dorothy Langan, and so many organic farmers who have been helped by Floyd Allen, have written us in praise of the job he did while serving as OGF West Coast Editor. "He laid the groundwork on certification. . . . His faith and confidence in us have given us strength."

"Small farmers, organic or not, desperately need to organize their marketing," explains Floyd Allen, "and around very carefully-defined com-

patible, realistic goals. Sometimes, this need only include three or four farmers working together on a loose arrangement to achieve maximum results and efficiencies for them. At other times, of course, something much broader is needed. Much depends upon the type and size of the farmers involved, area, commodities produced, market target, and similar factors already existing."

As part of the 1973 effort to build strong associations, we plan to permit qualifying groups to use the term: "Certified by Organic Gardening and Farming" along with the label used by each association. This will enable consumers to know that the association is working with the "ground rules" previously listed.

Each association must stress in its by-laws that it agrees with the principle of "farmer identification," and publicize the names and addresses of member growers so that consumers are encouraged to know them. However, there will be flexibility on the laboratory testing program so that each association can work out this aspect for itself.

The thorough analysis provided by the laboratory study of soils and plant tissues under our OGF pilot certification program in 1971 and 1972 has yielded an accurate profile of some organic farmers. It has also been a first line of defense against charges of "easy" standards in the organic market. Any critics who care to acquaint themselves with the California certification effort would have to be impressed with the thoroughness and attention to detail built into the laboratory analysis, field inspections and procedures questionnaires.

The same thoroughness has provided some handicaps as well. Every effort to build in protection and attention to detail drives up costs, and increased costs mean increased exclusiveness. The more limited the number of people we reach, the fewer are the benefits from certification, outside of the direct research benefit.

In 1973 and in future years, we plan to continue to work with Agri-Science Laboratories and others in the Midwest, East and South to gather important data on nutrient levels, residues and a range of variables. In gathering samples to analyze, we will be working with the leaders of the various associations around the country, and we plan to publish the findings in future OGF issues.

Since our certification program was first initiated, there have been several interesting developments in the organic community. The size of the whole community has grown, and so has its impact. With the increased size has come increased attention from all quarters. County extension agents are getting more questions about organic production. The agents themselves are looking for more and better information.

Both state and federal agencies have become increasingly interested in "regulating" the rapidly-growing organic food industry and in establishing standards to protect consumers against fraud.

Regional associations of organic farmers will be the most effective way for public agencies to assess the needs of individuals involved in organic agriculture. Such organizations will also be the most effective spokesmen to speak out when unfair pressure and harassing are given the organic movement.

Time and again, we have seen how organic organizations have broken through the communications barrier and how genuine benefits replaced antagonistic attitudes of the past. It's happened in Maine, Pennsylvania and South Carolina with such developments as exhibits of organic agriculture at trade shows, a full-fledged market development program, and new courses at the agricultural school.

If you are an organic farmer who wants to have the benefits of a recognized certification program with a minimal amount of expenses, now is the time for you to start up such a group in your region. We'll give you the help we can. Remember, the key is setting goals and standards that you as an organic farmer share with the consumers of the foods you grow.

The most important is that farm identification become a basic standard to all associations throughout the nation. When products appear on the market with a certification label from those associations, consumers can believe those foods are organically-grown and of high quality. As long as the buyer has access to the name and address of the farmer, he can praise or complain about the quality of that particular farmer. Fraud disappears as anonymity disappears and consumer confidence is built.

By harvest season of this year, we're hoping that there will be five times the number of organic farmer organizations we know about now — and that our 1973 Organic Certification Program will help the organic family farmers, and millions of people to consume organically-grown foods with more confidence and more economy.

REGIONAL ASSOCIATIONS OF ORGANIC PRODUCERS AND CONSUMERS

OGF Certification Is Being Offered to These and Similar Groups

PIEDMONT ORGANIC MOVEMENT ASSN.
Charles Parrett
714 S. Line Street
Greer, South Carolina 29651
(803) 877-4101

MAINE ORGANIC FOODS ASSN.
Charles Gould
P.O. Box 778
Lewiston, Maine 04240
(207) 783-8301
Ken Horn, Pres.
RD 1
Dixmont, Maine 04932
(207) 257-2276

COLORADO GROWERS' & MARKETERS' ASSN.
2555 W. 37th Avenue
Denver, Colorado 80211
(303) 477-6291

NORTHWEST ORGANIC FOOD PRODUCERS
Pat Langan, Pres.
Rt. 2, Box 163
Toppenish, Washington 98948
(509) 865-2697

NATURAL ORGANIC FARMERS ASSN.
Samuel Kaymen
Putney, Vermont 05346
(802) 387-4020

ORGANIC GROWERS ASSN.
Sarah McDonald—
David Rowley, Pres.
1312 Lobo Place NE
Albuquerque, New Mexico 87106

BLUEGRASS ORGANIC ASSN.
Mary Ann Gateforis
984 Maywick Drive
Lexington, Kentucky 40504
(606) 278-6640

FAMILY FARMERS
Malcolm Beck
RD 13, Box 210 TA
San Antonio, Texas 78218
(512) 651-6115

RURAL ADVANCEMENT FUND
Jim Pierce, Executive Dir.
1947 Lansdale Drive
Charlotte, N.C. 28205
(704) 537-6509 or 537-1745

Eastern Georgia Farmers Cooperative
Box 35
Waynesboro, Georgia 30830

Southern Agricultural Assn. of Va.
Box 734
So. Boston, Virginia 24592
(703) 476-2543

PENNSYLVANIA ORGANIC FARMERS ASSN.
601 W. Lemon Street
Lancaster, Pennsylvania

(12)

Legislation enacted by the state of California regulating labeling of organic food products for market

/

Assembly Bill No. 443

CHAPTER 914

An act to add and repeal Sections 26469, 26569.11, 26569.12, 26569.13, 26569.15, 26569.16, 26569.17, 26850.5, and 26850.6 to the Health and Safety Code, relating to organic food.

[Approved by Governor September 21, 1979. Filed with Secretary of State September 22, 1979.]

LEGISLATIVE COUNSEL'S DIGEST

AB 443, Gage. Organic food.

(1) Existing law does not provide standards relating to the advertising or labeling of food products as being organic, organically grown, naturally grown, wild, ecologically grown, or biologically grown.

This bill would specify standards within the Sherman Food, Drug, and Cosmetic Law for the use of such descriptive terms in the advertising or labeling of food products, as specified.

This bill would, within the Sherman Food, Drug, and Cosmetic Law, prohibit the use of such descriptive terms on labels of raw and processed food products, excluding seeds for planting, unless the product complies with the standards of the bill. Additionally, this bill would, within the Sherman Food, Drug, and Cosmetic Law, require that the label conform to the language specified or contain substantially similar language. The bill would provide that in the advertising or promotion of any food product, no claims or inferences, as specified in the bill, shall be made unless the food product conforms to the requirements in the bill.

A violation of the sections of this bill would be a misdemeanor pursuant to existing law.

(2) The State Department of Health Services is required pursuant to existing law to embargo any food, drug, device, or cosmetic suspected of being, among others, in violation of the provisions of the Sherman Food, Drug, and Cosmetic Law relating to food identity quality and fill, enrichment, adulteration, and misbranding, and, when there is such violation, to take action pursuant to such provisions to condemn such products or enjoin such violations. Such violations are misdemeanors pursuant to existing law.

This bill would also authorize any person, organization, or public or private entity to bring an action to enjoin violations of the provisions added by the bill, and authorize the court to award attorney's fees in such actions. The bill would expressly provide that such authorization does not limit or alter the powers of the department and its authorized agents to bring an action pursuant to other provisions of law.

The bill would exempt from such prohibitions relating to food,

with certain prescribed exceptions, any persons engaged in business as wholesale or retail food distributors.

It would also require certain growers, manufacturers, and sellers of food products to provide specified information to the department upon demand of the department. It would require the department to collect information kept by such a grower, manufacturer, or seller upon request of any person or entity. It would require the department to make such information available to any person or entity, as specified.

(3) This bill would also provide that, notwithstanding any provision of law, including the above-mentioned laws, no state agency has any affirmative obligation to adopt regulations or otherwise enforce the provisions provided in the bill.

(4) This bill would prescribe that its provisions remain in effect only until January 31, 1983, as specified.

(5) Under existing law, Sections 2231 and 2234 of the Revenue and Taxation Code require the state to reimburse local agencies and school districts for certain costs mandated by the state. Other provisions require the Department of Finance to review statutes disclaiming these costs and provide, in certain cases, for making claims to the State Board of Control for reimbursement.

This bill provides that no appropriation is made by this act pursuant to Section 2231 or 2234 for a specified reason, but recognizes that local agencies and school districts may pursue their other available remedies to seek reimbursement for these costs.

The people of the State of California do enact as follows:

SECTION 1. The Legislature hereby finds and declares that an increasing number of marketed food products are advertised or labeled as being organic, organically grown, naturally grown, or wild and that frequently such food products command premium prices.

The Legislature further finds and declares that in order to provide for the protection of the consumer and the farmer in this state, it is necessary that standards relating to the use of descriptive terms to fairly identify such food products be established.

In enacting the Organic Foods Act of 1979, the Legislature specifically makes no finding either that such food products are in any way superior to conventionally produced food products or that more conventionally produced food products lack safety, wholesomeness, or nutritional value.

SEC. 2. This act shall be known as the Organic Foods Act of 1979.

SEC. 3. Section 26469 is added to the Health and Safety Code, to read:

26469. It is unlawful to use the terms "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown," when advertising or otherwise making representations with respect to a raw agricultural commodity, processed food product, or meat, poultry, fish, or milk, in violation of Section 26569.11.

The prohibition of this section shall not apply to the term "wild" when such term is used to describe a flavor of a food or a plant variety.

The prohibition of this section shall not apply to the term "natural."

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 4. Section 26569.11 is added to the Health and Safety Code, to read:

26569.11. Except as otherwise provided in this division, the terms "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown" shall be used after January 1, 1981, in the labeling or advertising of a food only for any of the following:

(a) Raw agricultural commodities without applied coloring or synthetically compounded materials in the unpeeled natural form, except rapid heating or chilling, and which meet the following requirements:

(1) Are produced, harvested, distributed, stored, processed, and packaged without application of synthetically compounded fertilizers, pesticides, or growth regulators.

(2) Additionally, in the case of perennial crops, no synthetically compounded fertilizers, pesticides, or growth regulators shall be applied to the field or area in which the commodity is grown for 12 months prior to the appearance of flower buds and throughout the entire growing and harvest season of the particular commodity.

(3) Additionally, in the case of annual crops and two-year crops, no synthetically compounded fertilizers, pesticides, or growth regulators shall be applied to the field or area in which the commodity is grown for 12 months prior to seed planting or transplanting and throughout the entire growing and harvest season for the particular commodity.

Only microorganisms, microbiological products, and materials consisting of, or derived or extracted solely from, plant, animal, or mineral-bearing rock substances, may be applied in the production, storing, processing, harvesting, or packaging of raw agricultural commodities, other than seeds for planting, in order to meet the requirements of this subdivision. However, before harvest, the application of bordeaux mixes and trace elements, soluble kelp, lime, sulfur, gypsum, dormant oils, summer oils, fish emulsion, and soap are permitted, except that the application of aromatic petroleum solvents, diesel, and other petroleum fractions, used as weed or carrot oils, are prohibited. For purposes of this subdivision, "synthetically compounded" means those products formulated by a process which chemically changes a material or substance extracted

from naturally occurring plant, animal, or mineral sources, excepting microbiological processes.

(b) Processed foods manufactured only from raw agricultural commodities as described in subdivision (a). The use of ascorbic acid, sodium ascorbate, calcium ascorbate, and citric acid as an antioxidant or chelate is permitted in processed foods under this subdivision.

(c) Processed foods manufactured only from raw agricultural commodities as described in subdivision (a) and processed foods as described in subdivision (b).

(d) Meat, poultry, or fish produced without the use of any chemical or drug to stimulate or regulate growth or tenderness and without any drugs or antibiotics administered or introduced to such animal by injection or ingestion, except for treatment of a specific disease or malady and in no event administered or introduced within 90 days of the slaughter of such animal; at least the final 60 percent of the sale weight of each animal, bird, or fish shall have been raised on feed without medication which complies with subdivision (a).

(e) Milk from animals, which are raised on feed without medication, which feed complies with the provisions of subdivision (a) or (b) and into which animal no drugs or antibiotics have been administered or introduced to such animal by injection or ingestion, except for treatment of a specific disease or malady and in no event administered or introduced within 30 days prior to the production of such milk.

(f) No product shall be labeled or advertised as a "wild" product unless such product is wholly derived from an undomesticated or uncultivated source and complies with the provisions of subdivision (a).

(g) No claim or implication shall be made in the advertising or promotion of a food product that the food product is organic, organically grown, naturally grown, wild, ecologically grown, or biologically grown, unless it conforms to the requirements of this section.

(h) This section shall not apply to the term "natural" when used in the labeling or advertising of a food.

This section shall not apply to the term "wild" when such term is used to describe a flavor of a food or a plant variety.

(i) This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 5. Section 26569.12 is added to the Health and Safety Code, to read:

26569.12. Except as otherwise provided in this division, no food product shall be labeled as "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown", which has any pesticide residue in excess of 10 percent of the level regarded as safe by the federal Food and Drug Administration.

The prohibition of this section shall not apply to the term "wild"

when such term is used to describe a flavor of a food or a plant variety.

The prohibition of this section shall not apply to the term "natural."

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 6. Section 26569.13 is added to the Health and Safety Code, to read:

26569.13. (a) Except as otherwise provided in this division, the terms "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown" shall not be used for the advertising or labeling of a raw agricultural commodity, processed food product, or meat, poultry, fish, or milk, unless it complies with the provisions of Section 26569.11 and is prominently labeled as follows, or with substantially similar language:

(1) For raw agricultural food products:
ORGANICALLY GROWN IN ACCORDANCE WITH SECTION 26569.11 OF THE CALIFORNIA HEALTH AND SAFETY CODE

(2) For processed food products:
ORGANICALLY GROWN AND PROCESSED IN ACCORDANCE WITH SECTION 26569.11 OF THE CALIFORNIA HEALTH AND SAFETY CODE

(3) For meat, poultry, fish, or milk:
ORGANICALLY PRODUCED IN ACCORDANCE WITH SECTION 26569.11 OF THE CALIFORNIA HEALTH AND SAFETY CODE

(b) For unpackaged foods, the requirements of subdivision (a) relating to labeling shall be deemed to have been met if such labeling appears prominently on or over the bin or container holding the food.

The prohibition of this section shall not apply to the term "wild" when such term is used to describe a flavor of a food or a plant variety.

The prohibition of this section shall not apply to the term "natural."

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 7. Section 26569.15 is added to the Health and Safety Code, to read:

26569.15. When a food product subject to the provisions of Section 26569.11 is labeled as "certified," the name of the person or organization which provides such certification shall be listed on the label.

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is

chaptered before such date, deletes or extends such date.

SEC. 8. Section 26569.16 is added to the Health and Safety Code, to read:

26569.16. (a) All growers who sell farm products identified as "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown" shall keep accurate records of the location of the acreage used for growing such products and the additions, excluding water, made to the soil or applied to the plants or added to irrigation water. Such records shall be retained for two years after the crop is sold and delivered by the grower.

(b) All persons who process or manufacture food products which are sold identified as "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown" shall keep accurate records as to the ingredients of the product and the names and addresses of persons from whom the ingredients were purchased. Such records shall be retained for two years after the food product is sold and delivered.

(c) All persons who sell such food products shall keep accurate records of the names and addresses of persons from whom such products were purchased. Such records shall be retained for two years after the food product is sold and delivered.

(d) Growers, manufacturers, and sellers of such products shall provide the department, upon demand, with the relevant information from the records required pursuant to this section.

(e) The department shall, upon request, provide copies of any information collected pursuant to this section to any person or entity. The department shall collect information kept by a grower, manufacturer, or seller pursuant to this section upon request of any person or entity. In providing such copies, the department may charge such requesting person or entity a fee for the cost of reproducing such information.

(f) The provisions of this section shall not apply to the term "wild" when such term is used to describe a flavor of a food or a plant variety.

This section shall not apply to the term "natural."

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 9. Section 26569.17 is added to the Health and Safety Code, to read:

26569.17. The prohibitions or requirements contained in Sections 26569.11 to 26569.16, inclusive, shall not apply to persons engaged in business as wholesale or retail distributors of the commodities referred to in Sections 26569.11 to 26569.16, inclusive, except to the extent that such persons:

(1) Are engaged in the manufacturing, packaging, or labeling of such commodities, except that the prohibitions or requirements contained in Sections 26569.11 to 26569.16, inclusive, shall not apply

to any such wholesale or retail distributor who in good faith makes the same representations on a package or label as have been made in writing or printed advertising or labeling by the manufacturer, distributor, or other person providing the product to such wholesale or retail distributor.

(2) Prescribe or specify by the specific means in violation of Sections 26569.11 to 26569.16, inclusive, the manner in which such commodities are manufactured, packaged, or labeled.

(3) Have knowledge of the violation of any provisions of Sections 26569.11 to 26569.16, inclusive, by any specific batch of such commodities and continue to sell or distribute such specific batch of such commodity.

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 9.5. Section 26850.5 is added to the Health and Safety Code, to read:

26850.5. (a) Notwithstanding the provisions of Section 26850 or any other provision of law, any person, organization, or public or private entity, may bring an action in superior court pursuant to this section and such court shall have jurisdiction upon hearing and for cause shown, to grant a temporary or permanent injunction restraining any person from violating any provision of Sections 26569.11 to 26569.16, inclusive. Any proceeding under the provisions of this section shall conform to the requirements of Chapter 3 (commencing with Section 525) of Title 7 of Part 2 of the Code of Civil Procedure, except that such person, organization, or entity shall not be required to allege facts necessary to show, or tending to show, lack of adequate remedy at law, or to show, or tending to show, irreparable damage or loss, or to show, or tending to show, unique or special individual injury or damages.

(b) In addition to the injunctive relief provided in subdivision (a), the court may award to such person, organization, or entity reasonable attorney's fees as determined by the court.

(c) The provisions of this section shall not be construed to limit or alter the powers of the department and its authorized agents to bring an action to enforce the provisions of this chapter pursuant to Section 26850 or any other provision of law.

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 10. Section 26850.6 is added to the Health and Safety Code, to read:

26850.6. Notwithstanding any provision of this division, including, but not limited to, Sections 26200, 26202, 26205, 26206, 26207, 26208, 26210, 26230, 26232, 26409, 26433, 26434, 26436, 26438, 26550, 26561, 26564, 26569.9, 26581, 26582, and 26590, and Article 2 (commencing with Section 26811), Article 3 (commencing with

Section 26830), or Article 4 (commencing with Section 26850) of Chapter 8, or any other provision of law, no state agency shall have any affirmative obligation to adopt regulations or otherwise to enforce the provisions of the Organic Foods Act of 1979, including but not limited to, the provisions of Section 26569.11.

This section shall remain in effect only until January 31, 1983, and as of such date is repealed, unless a later enacted statute, which is chaptered before such date, deletes or extends such date.

SEC. 11. Notwithstanding Section 2231 or 2234 of the Revenue and Taxation Code, no appropriation is made by this act pursuant to these sections because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction. It is recognized, however, that a local agency or school district may pursue any remedies to obtain reimbursement available to it under Chapter 3 (commencing with Section 2201) of Part 4 of Division 1 of that code.

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COOPERATIVE EXTENSION SERVICE

UNIVERSITY OF ALASKA
FAIRBANKS ALASKA 99701

2651 Providence Avenue
Anchorage, Alaska 99504
Phone: (907)263-1866

June 3, 1980

Ms. Lynn Rice
F-4 Cedar Park
Juneau, Alaska 99801

Dear Ms. Rice:

Dr. Matthews has referred your recent letters regarding organic gardening and integrated pest management to my office for reply.

Your letters indicate that you have made considerable study of organic food production and pest control. I spent a number of years as the District Agricultural Agent at Palmer and worked with a number of organic gardeners in the Matanuska Valley. They too were well read and well informed. For many years one of them furnished me with a subscription to organic gardening. I am presently on the mailing list for another publication from Rodale Press,Inc., "The New Farm."

You probably know our Extension Agent in Juneau, Walt McPherson. I have had the opportunity to admire and consume some of the results of Walt's excellent gardening capability. Walt used considerable organic material in building up his garden site. Walt also recommends clover in lawn mixtures for nitrogen fixation. For many years, we have had a fact sheet on "The Compost Heap." I mention this to indicate the importance we attach to organic practices.

We also emphasize Integrated Pest Management (IPM). To further our agent capability and understanding of this approach we are making plans for a staff workshop on IPM this coming August. We think it is very important to educate people not to use pesticides where pesticides are not needed.

I would suggest you visit with Walt McPherson regarding your question on land for urban gardeners in Juneau. A number of communities in Alaska have made land available for urban gardening. In Palmer, the Matanuska Valley Federal Credit Union has been a sponsor of the community garden. It would seem there might be land in or near Juneau that could be used for a community gardening project.

I hope we are responding to questions from organic procedures in an appropriate manner. We are always interested in clientele input and I would appreciate your viewpoints on our extension programming in Alaska. All of our publications would be available through our Juneau office.

Thank for your interest.

Sincerely,

Peter M. Probasco
Associate Director

baf

CC Dr. James W. Matthews
Walt McPherson

JAY S. HAMMOND
GOVERNOR

STATE OF ALASKA
OFFICE OF THE GOVERNOR
JUNEAU

March 27, 1980

Ms. Lynn Rice
F-4 Cedar Park
Juneau, Alaska 99801

Dear Ms. Rice:

Thank you for your recent letter concerning organic farming methods.

As Alaska continues to develop its agriculture industry, the need to protect our land and wildlife resources is of paramount importance. Chemical dependency in raising crops should be avoided if at all possible, as we expand this new and viable industry in Alaska.

Again, thank you for your very informative letter.

Sincerely,

Jay S. Hammond
Governor

July 21, 1980

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Weed-eating geese live to eat almost anything

BURLEY, Idaho (AP) — They waddle down rows of crops gobbling up everything green but the plants they are hired to protect.

"They are eating machines. They live to eat," says Dennis Sewald of the Chinese weeder geese he introduced to Idaho this year as an alternative to chemical herbicides. "They are like a sheep dog that's bred to herd sheep."

The birds were developed 2,000 years ago in China to combat the bane of a farmer's life — the common weed. Recently they have been used by organic farmers in the Pacific Northwest and California, where Sewald, principal owner of Idaho Organic Farms, first saw them.

Weeder geese will eat their own weight or more in greenery every day, and Sewald says 1,500 of the birds will weed 500 acres of crops within a week. They are most effective in the spring "when the weed is a mouthful rather than a meal."

Some of those familiar with weeder geese insist the birds sense they aren't supposed to eat anything planted in rows, but Sewald says that's ridiculous — they just prefer weeds to crops.

"There's a point at where they're hungry but they want something else to eat, and then you have to pick them up. If you leave them out there, they'll eat your crop," he said.

That point comes when between 75 percent and 90 percent of the weeds have been devoured, he says.

One of the advantages to using weeder geese, Sewald said, is that "they turn all the green into instant fertilizer."

Since Jan. 1, when Idaho Organic Farms received 8,000 day-old poults from California, Sewald has leased the birds to two dozen farmers at $10 to $20 an acre after the farmer learns to handle the geese. The price is higher if Sewald must use his own handlers.

He said chemicals would cost between $75 and $150 per acre.

Sewald said response to the birds has been enthusiastic. He plans to have two 5,000-egg incubators at the company's Goose Creek Ranch and 125,000 birds by next spring. Fertile eggs and baby geese will be shipped to markets throughout the United States and some foreign countries.

Sewald hauls a flock of 1,500 geese around in a large white three-tiered trailer he designed and built. Trained leader geese walk up the ramp, the rest following, and three people can load the whole trailer in about 10 minutes.

Running the geese on crops that have been heavily treated with chemical herbicides and pesticides can be costly.

Public Notic

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99801, until 2:00 P.M., local time on
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Contract documents, including
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WITH THE EDITOR

Robert Rodale

Organic Food Helps Prevent Cancer

Diet is the most exciting area for action on cancer prevention. Research findings linking the kind of food eaten to the ability to ward off cancer are being published with increasing frequency.

There are two ways to think about food and diet in the control of cancer. First is the probability that certain foods contain specific substances that either prevent or promote cancer. We are rapidly finding what those cancer-related substances are and which foods are likely to contain them. You can now begin to plan a diet of foods that contain less of the cancer promoters and more of the cancer-preventing substances. In my previous two articles in this series I've suggested how you can manage your diet to balance those cancer-specific substances in the best way—given our current state of knowledge about them.

The second approach to diet and cancer prevention is to consider food in a broad way, thinking about how it is grown, what chemicals are used in its production and processing, and how those aspects of food production influence your power to avoid cancer. Much of the food sold today is of doubtful use in cancer prevention—even when it contains specific substances that indicate anticancer effects in laboratory tests. Conventional food is grown in a highly chemicalized, almost artificial environment. The soil of conventional farms is fertilized heavily with synthetic materials, some of which can be toxic or disruptive to the soil's ecology. Mineral balance of plants grown on such soil can be quite different from the mineral balance of natural or organically grown plants.

Artificial fertilization of the soil is only the beginning of the problem with conventional food quality. On regular farms, many different toxic chemicals are used to control weeds, treat plant diseases and kill insects and other pests. The poisonous nature of those pesticides is staggering to contemplate. Tiny amounts have the power to kill large numbers of people and animals. Yet they are spread thoroughly across many American farms—and are sometimes applied as often as once every few days throughout the growing season.

Many of these chemicals are gone from the food by the time you buy it. But not all are gone. And some that have dissipated have merely changed their chemical nature, emerging as other forms of chemicals which still have the potential to cause problems. Most worrisome of all is the mixing of many different poisonous chemicals that takes place on farms. Each chemical alone can be a serious problem, but when combined with others, totally new and even more toxic compounds can be formed. That is called potentiation, which is a complex word saying that conventional food can be a chemical soup, the exact recipe for which is not known by anyone.

Problems With Pesticides

The U.S. Department of Agriculture and the Food and Drug Administration make efforts to detect and restrict residues of pesticides on foods. But there are many problems with the approaches being used. Little is known about the effect of the mixing of so many different chemicals in our food environment. And even less effort has been applied to finding ways for farmers to grow crops using very few pesticides, or none at all. Presently, when one pesticide is found to be dangerous and is taken away from farmers, a switch is made to another for the same purpose, and that other chemical may eventually be found to be harmful, too. All the while, insects are developing immunity to pesticides, forcing the chemical companies to constantly develop more powerful compounds. It is a vicious cycle.

Your best way to get protection from agricultural chemicals is to eat food that has been grown organically. Organic farmers avoid using artificial fertilizers, weed killers and synthetic pesticides. They farm naturally, using as soil builders natural substances like manure, compost, limestone and pulverized phosphate rock. They build the health of their soil, and rely on that health to produce healthy plants.

Insect problems on organic farms are also managed in natural ways. The farmer usually chooses to grow crops that are suited to his

region and soil, minimizing problems of disease and insect attack. Special resistant varieties of plants are often selected and used. Crops are rotated, so the same plants are not grown in one place year after year, allowing insect populations to build up. The organically rich soil itself helps, by producing plants that are often much stronger and healthier than those grown on conventional farms. In ways not yet fully explained, those organic plants often resist insect attack.

The Organic Alternative

Years ago, when everyone ate food that was very much like the organic food of today, there was much less cancer. Of course, the world as a whole was much less chemicalized then than now, but food is by far our greatest environmental exposure. I am convinced that if we can grow and eat food that has been produced naturally, by the organic system, we will be taking a giant step toward cancer protection. You always need to keep in mind that you have a choice about the kind of food you can eat. You don't have to eat what everyone around you is eating. Often, you can even save money and make life easier for yourself by choosing to eat food that is more healthful. That's no always possible, but it can be done.

What is the best way to get organic food? And especially, how can you save money by doing so? That seems like a tough order to fill, since many of us have seen organic food offered for sale at higher than usual prices, and sometimes the appearance of the organic produce—fruits and vegetables, for example—didn't match that of the conventional produce sold in supermarkets. But there is a way.

First, I'd like to say something about appearance. I have seen many organic fruits and vegetables that were completely unmarked—free of insect attack. But I have also seen much organic produce that had a few holes in it here or there, or had some blemishes. If you are going to protect yourself from cancer by eating better food, it's important not to let those small marks on vegetables and fruit bother you. Much of the spraying and poisoning that happens on farms today is done to prevent visual blemishes, not to protect the nutritional value of the food itself, There is a parallel between that kind of spraying and the putting of cosmetics on a corpse. Much work and cost goes into making the product look good, but there is something badly wrong inside. Why fall for that kind of foolery? If the American public would learn to accept produce with slight visual blemishes, I believe that a significant amount of all pesticide sprays could be eliminated immediately and the cancer rate would then start to go down dramatically.

Next, you should start thinking of your switch to organic foods as fitting right in with a sensible and healthful diet system. That means your diet should be low in processed food, fat of all kinds, sugar and

salt. Red meat should be eaten sparingly, if at all (a big money saver). Eat more whole grains, fresh fruits and vegetables, and fish. Low-fat fin fish from the sea such as haddock, cod, flounder, pollack and halibut are about as organic a food as you can get, because the oceans are as yet relatively unpolluted. So if you eat more of these fresh ocean fish, you are taking a big step toward an organic diet.

Grains are the easiest foods for farmers to grow organically, and are sold at moderate cost. You can add a big organic component to your diet by starting to bake your own bread, using organically produced flour. And you can add organic whole grains to your diet in other ways, such as by using them for breakfast cereal, adding to soups and stews, and using in casseroles. Making your own sprouts from organic whole grains and seeds, in particular soybeans, is a fantastic way to dechemicalize your diet, save money, and build cancer protection into your diet.

The money savings that can be achieved by eating more whole grains are large. And those savings are the result of two factors. First, whole grains and beans are almost always eaten in place of much more expensive foods, such as meat. From that switch alone the average person can save several hundred dollars a year. Second, by processing whole grains yourself, such as by making bread and growing your own sprouts, you also save. Much of the cost of those foods is in the labor, packaging and shipping. They are enjoyable and easy to make at home, so with little trouble you can reduce your food cost still further.

Where can you get organic whole grains and beans? Most health food stores and natural foods stores sell them. So do some mail order companies. Some people who live in rural areas even buy them direct from farmers. Others get them from co-ops.

What about sources for organic vegetables and fruits? A good way to get them is to grow them yourself. Millions and millions of people are doing that now. There are over 30 million home gardens in the U.S., and studies show that over half use organic methods to at least some extent. Even people who live in apartments or downtown in cities are gardening organically—indoors, on rooftops and in community gardens. Gardening is booming. It's fun, saves money, and gives you something constructive to do when you can't get or afford gasoline to carry you to other activities. And because home gardening is a good way to produce plenty of organic fresh vegetables, which are delightful when eaten raw or lightly cooked, it's an excellent part of your cancer-prevention program.

Farmers' markets and curbside "greenmarkets" are another good source of organic produce. Usually, the prices charged are competitive, or even lower than storebought vegetables. You can also get organic produce from some health food stores. The price could be higher than

for conventionally grown produce, but not always.

I believe the price of organic food of all kinds will soon be on a level with conventional food, and maybe even lower. Rising energy costs are the factor that could work that miracle. Two or three times as much energy is needed to produce conventional produce, especially if it is trucked across country to find a market. Organic food, grown locally using local fertilizers, is bound to become less costly soon.

Even if the cost today of some items is higher, ask yourself this: How do you want to pay to cope with cancer? Would you rather pay a little more now for some foods that could be protective, or are you going to pay later for very expensive medical treatment that probably won't bring about a cure? The choice is up to you.

Ideas for Organic Action

If you are a farmer or member of a farm family—especially one that still farms with toxic chemicals—think for a moment about how you feel. Do you get more colds than you think you should? How are your nerves? Respiratory and nerve problems are an early-warning sign of overexposure to toxic chemicals, such as pesticides. And farmers who rely heavily on the use of pesticides would be more likely to suffer from these problems.

What comes next? Is life on the farm turning into an obstacle course through a chemical jungle? Many farmers think so, and that's one reason they're turning to organic methods in growing numbers. They want to get as far as possible from the skull and crossbones on the chemical can, and all the hazards to health that they symbolize.

Changing to organics is not always easy for farmers to do, though. They get almost no encouragement or useful advice from their county agents, federal employees who are supposed to teach them the best way to farm. The U.S. Department of Agriculture has, up to now, had no program of research into organic methods. Neither have many of the state agriculture universities, which get liberal funding from the government for research. The prochemical philosophy is deeply ingrained in the thinking and practice of most agricultural scientists.

That situation must change quickly if real progress is to be made in cancer-prevention through diet purity. And the only way to accelerate that change is by putting political pressure on the people who make the decisions about how agricultural research and education funds are spent.

Agricultural research policy is much more political than is medical and nutritional research, which is done mainly by very independent-minded scientists, working to a large extent in private hospitals and medical schools. A much greater percentage of agricultural research is paid for directly by taxpayers, and the kind of studies and educational work done is decided largely by government officials.

If city people would express concern to their representatives about the lack of funding for study of nonchemical farming, you would be amazed at how quickly the situation would change. I can think of no type of political action which is more likely to create a reduction in the rate of cancer incidence and mortality in this country. The war against cancer needs to be fought in the laboratories and test plots of agricultural researchers, as well as in the medical schools. Excellent health results would be achieved if they would put a small fraction of the effort now given to the development of chemical farming into the study and encouragement of organic methods.

Fortunately, a start has already been made in rethinking agricultural research policy. A key person in that effort is Anson Bertrand, Ph.D., director of the recently created Science and Education Administration of the U.S. Department of Agriculture. Dr. Bertrand is a very respected and open-minded person who has a sincere interest in finding out more about the potential of organic farming. Last spring he appointed a study group of USDA scientists who were told to find out as much as they could about the potential of organic methods, and to suggest plans for research that would help organic farmers. By the time you read this, that report may have been completed. We will tell you in a future issue about the recommendations that it makes.

Now is not too early to start a grass-roots political effort to awaken Congress to the demand in America for food produced by nonchemical methods. We need to turn the attention of government-paid scientists away from the testing and use of ever-more-powerful pesticides developed by the chemical companies toward research into the simple, low-cost and safe ways to grow food without the use of any toxic chemicals at all. It can be done. Many organic farmers have already shown that those chemicals are not necessary. But we need a broad base of research and education support to show that organic farming is a method within the grasp of almost any farmer.

To sum up, here are my action-against-cancer suggestions for this month:

1. Start baking bread using organically grown grain.
2. Plan an organic garden.
3. Write your representative and senator expressing your interest in more research and education support for organic farming methods.

A note to Dr. Bertrand could also be helpful. His address is: Room 302, Administration Building, USDA, Washington, D.C. 20250.

For a practical way of obtaining organic food, please see the article "How Can You Tell If a Food Is Organic?" on page [illegible]

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