

Purdue PC-LP Farm Plan B-21 Crop Input Form

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Web Version

This version of the input form has duplicate pages removed to reduce printing time. Pages 20, 22, 24, 26, 28, 30,32, 34, 38, 40, & 46 have been removed

Name _____ Phone _____

Address _____

E-Mail _____

Farm ID (to be completed at workshop) _____

Plan Description (Start with your last name) _____

(up to 60 characters per line)

Circle
pages
used

5

7

9

11

15

17

19

21

23

25

27

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33

35

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41

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Introduction

B-21 is a version of PC-LP, a computer based farm planning model. This version of PC-LP can be used to help you answer at least four types of questions about the best use of your crop farm resources: namely,

1. Timeliness — Do you have enough labor and the right size machinery?
2. Crop Rotation — Are you growing the most profitable acreage of each rotation?
3. Technology or Tillage System — Do you use the right technology or tillage system?
4. Farm Size — Should you change the number of acres that you farm?

Using linear programming, the computer will combine the land, labor, machinery resources, and crop alternatives you indicate to farm your acreage in the most profitable way. Subject to any limiting conditions you describe, the computer determines your best crop mix, the combination which maximizes the returns to your resources. By comparing solutions with different farm sizes, machinery and labor complements, crop yields, costs and prices, you can select your best plan.

In B-21, the authors have already set the time periods and the crops you might consider. By completing this Input Form, you will describe the resources that you have available, you will specify your crop rotations, you will describe your tillage systems, and you will indicate your expected crop price, crop yields, and cost of production.

The computer is programmed to keep a file of the farm data you provide in this input form. To make additions, change your answers in another input form (available at the workshop). Data entry persons will then change your file and re-solve your plan. To learn the effect of each change, make only one or a few changes per input form.

For some questions, example numbers are shown in parentheses. These are presented to guide you as you answer the questions. They are ***not*** included as default data in the program. If you do not place a number in a blank, it will be treated as zero.

LABOR RESOURCES

All labor is assumed to be of the same quality. That is, it is assumed that any of the permanent or temporary people can operate any of your machinery.

Question 1. Permanent people include yourself, your family and your salaried people available to work each good field day during the busy spring and fall seasons. They are not hourly paid employees who will be hired only if needed. Also include the appropriate fraction for a permanent person who is available only part of a day for crop production activities.

Question 2. How many hours per day, in the field, constitute a shift for your permanent persons? For example, to average 12 hours per day in the field, a person is likely out of the house about 16 hours. Do not over-estimate your availability.

Question 3. How many temporary people are available to work by the hour if needed? For your first plan include only the number of persons you presently hire at any one time, on a temporary basis.

Question 4. The temporary people are assumed to be hired only on days suitable for field work. How many hours per day can temporary people work, if needed?

Question 5. What is the temporary person hourly wage rate, including taxes and benefits? Recognize the computer will hire temporary people only if:

- (1) Machinery resources are available; and
- (2) No additional permanent people are available; and
- (3) Temporary people are available; and
- (4) It is more profitable to hire them, pay their wage and do the job now, rather than in a time period when permanent (free to the computer) people are available.

DRYING AND STORAGE RESOURCES

The authors chose the plant/harvest date moisture for each crop, as shown in the yield adjustment sets on pages 43-47. The authors have also decided the moisture at which all crops are stored or sold at harvest, as well as the per point off-farm and on-farm drying cost. These are as follows:

<u>Crop</u>	<u>Storage Moisture</u>	<u>Per Point Drying Cost</u>	
		<u>Off-farm</u>	<u>On-farm</u>
Corn	15%	\$.025	\$.012
Wheat	13%	.025	.012
Beans	13%	.0	.0

LAND RESOURCES

The computer is programmed to use your land to grow the crops that will provide the greatest return given your labor and machinery time. All land and labor is assumed to be the same quality.

Question 1. Enter your total row crop and small grain acres, for both owned and presently rented land. *Do not include your hay acres.*

1. How many cropland acres are you farming? (750) _____

LABOR RESOURCES

1. How many permanent people do you have? (1) _____
2. How many hours per day can they work? (12) _____
3. How many temporary people do you have? (2.5) _____
4. How many hours per day can they work? (12) _____
5. What is the temporary hourly wage rate? (10) _____

DRYING AND STORAGE RESOURCES

You have the opportunity to indicate your dryer capacity in the following two ways:

1. How many hours per day does the dryer run? For example 20 hours. (20) _____
2. What is the dryer capacity in points of moisture removed per hour?
For example 2500 = 10 points removed from 250 bushels. (2500) _____

Corn and soybeans may be placed in on-farm storage.

3. What is the bushels of capacity of your storage? (40000) _____

FIELD TIME RESOURCES

Everyone has 24 hours per day. Effective field time and machinery time depend on weather, soil type, drainage, length of time you are willing to have people and equipment operate each day, machinery breakdowns, distance between fields and the days worked each week.

Good Field Days

Good field days represent the number of days, including Sundays, in each period that field work can occur. For each of the 20 periods in the model, you are asked to indicate the number of days you can do field work on your farm.

Because yield penalties for late planting or harvest are generally severe in the Eastern Cornbelt, the 75th-85th worst year in 100 in the spring and the 55th-60th worst year in 100 in the fall was chosen as the appropriate estimate for good field days when evaluating timeliness.

Our estimate of good field days for each period is listed in the default column on page 7. To use our good field days, enter 1.0 in the column multiplier box for good field days/period. You may wish to input a different number of good field days. If you estimate 10 percent more good days in all periods, enter 1.10 in the box.

To change the number of good field days available for a particular time period, enter the desired number of days on the entry line for the period. To specify 3.5 days for May 10-16, enter 3.5 on the May 10-16 line in the Good Field Days/Period column. Your entry in the Good Field Days/Period column will replace the default value for that period.

Work Days Per Week

Do you wish to plan on performing field work on Sunday if it's a good field day? You are asked to indicate the number of days you plan to work each week. If you wish your plan to be based on a 6 day work week for most or all periods, enter 6.0 in the column multiplier box. You will then work only 6/7 of the good field days available in the period. If there are some periods during the year that you wish to have the plan based on a 7 day work week, enter a 7.0 on the "Days Per Week" entry line for those periods only. Enter 6.5 if you plan to work half days on Sundays.

SUITABLE FIELD DAYS AND DAYS WORKED EACH WEEK

Period Number	Time Period	Period Length	Good Field Days/Period Default	Your Good Field Days Per Period	Work Days Per Week
				Column multipliers:	
				<input type="text"/>	<input type="text"/>
1	December 6-April 21	19½ Weeks	9.3	_____	_____
2	April 22-April 25	½ Week	1.3	_____	_____
3	April 26-May 2	1 Week	2.4	_____	_____
4	May 3-May 9	1 Week	2.4	_____	_____
5	May 10-May 16	1 Week	3.1	_____	_____
6	May 17-May 23	1 Week	3.1	_____	_____
7	May 24-May 30	1 Week	3.8	_____	_____
8	May 31-June 6	1 Week	3.8	_____	_____
9	June 7-June 13	1 Week	3.5	_____	_____
10	June 14-June 20	1 Week	3.5	_____	_____
11	June 21-June 27	1 Week	3.5	_____	_____
12	June 28-July 4	1 Week	3.5	_____	_____
13	July 5-July 11	1 Week	3.5	_____	_____
14	July 12-August 29	7 Weeks	29.0	_____	_____
15	August 30-September 19	3 Weeks	12.3	_____	_____
16	Sept 20-Sept 26	1 Week	4.2	_____	_____
17	September 27-October 10	2 Weeks	8.2	_____	_____
18	October 11-October 31	3 Weeks	12.2	_____	_____
19	Nov 1-Nov 14	2 Weeks	8.1	_____	_____
20	November 15-Dec 5	3 Weeks	9.9	_____	_____

MACHINERY RESOURCES

List your present machinery in one of four groups; tractors, tillage and post-plant, planters, or harvesters. For each group, note the ID number of each row. Later, on pages 17-41, enter the appropriate ID numbers to indicate machine operations you use for each crop.

First indicate your number of tractors and the hours per day each is available. You have a choice. You may treat all your tractor resources as one pool available for use with any of your machinery. In this case, enter your tractor information on Line 1. You may divide your tractors into two size groups. Enter the number of big tractors you have available on Line 1 and indicate the hours each is available per day for field work. Do the same for your small tractors. You decide how many of your tractors belong in each category. Please include only the tractors, and later only the other machines, that you actually use in crop production.

Second, enter your tillage and post-planting equipment. List all like kind (and near like size) on one line. Indicate the number of machines of that type on that line along with the hours each machine is available for a good field day. *Be conservative. Perhaps list only the hours per day a machine is used now.* Also indicate the ID number of the tractor size needed. If you don't use a tractor, indicate "0" as tractor size ID. Also indicate the number of persons per machine hour. For example, you might indicate 1.0 persons for plow and disc, but, say, 1.2 or 1.5 persons for anhydrous or sprayer. The labor question for planters and harvesters is asked by crop on pages 17-41.

For harvesters, also indicate the tractor ID and tractor hours used per harvester hour if you use a tractor to pull the harvester or to haul the crop. For other equipment, the authors have already entered 1.0 tractor hours per machine hour.

Recognize that the name of the equipment is only a label. You can describe other tillage or post-plant equipment on a line by providing the requested data and then using the line number when describing crop production on pages 17-41. However, in the solution reports, machine use will be reported by the label used in this input form. Be sure to specify a machine is available if required in production.

Next, enter your planters. You can have up to three types. One is labeled a corn planter. A second is labeled a drill and a third is listed as other. Note on most crop operations pages, the authors have already indicated a planter ID number consistent with the crop name.

Finally, enter your harvesters. You can have three harvester types; combine, OtherHarv1, and OtherHarv2. The "Other" harvesters could represent a forage harvester, corn picker, custom harvester, or some other type of harvester. You can use any harvester type on any crop. For example, suppose you want to describe seed corn or corn silage as one of the corn crops. Then, you can use harvester ID "2" or "3" to harvest such a crop.

Note that you are asked to indicate the hours per day each type of harvester is available to work. Suppose you use your combine to harvest corn for 10 hours per day, but you work in beans only 7 hours per day. You can enter only 10 or 7 but not both numbers. Suppose you enter 10 hours here. Then, when you complete your bean input form (page 27, 29, 31, or 33) decrease your working rate in acres per hour to $.7 \times$ your actual bean harvest rate so as to use 10 hours in the computer to harvest your normal daily acreage of beans. Also, on your bean crop input form, indicate only $.7 \times$ your harvest labor hours per machine hour. For example, if you really harvest beans at 4 acres per hour, indicate $.7 \times 4 = \underline{2.8}$ acres per hour. And if you really need 1.5 persons in your bean harvest crew, indicate $.7 \times 1.5 = \underline{1.05}$ labor hours per machine hours.

MACHINERY RESOURCES

Tractor Sizes, Numbers, and Time Available

ID Number	Tractor Size	Number of Tractors	Hours Available/Day/Tractor
1	Big Tractors	_____	_____
2	Small Tractors	_____	_____

Tillage and Post-Planting Machine Type, Numbers, Time Available, and Tractors Used

ID Number	Type	Number of Machines	Hours Available Per Day Per Machine	Tractor Size ID Needed	Labor Hours Per Machine Hour
1	P & K Spreader	_____	_____	_____	_____
2	Plow	_____	_____	_____	_____
3	Chisel	_____	_____	_____	_____
4	Anhydrous	_____	_____	_____	_____
5	Disc	_____	_____	_____	_____
6	Field Cultivator	_____	_____	_____	_____
7	Sprayer	_____	_____	_____	_____
8	Rotary Hoe	_____	_____	_____	_____
9	Cultivator	_____	_____	_____	_____
10	Other	_____	_____	_____	_____

Planter Type Numbers, Time Available, and Tractors Used

ID Number	Type	Number of Machines	Hours Available Per Day Per Machine	Tractor Size ID Needed
1	Corn Planter	_____	_____	_____
2	Drill	_____	_____	_____
3	Other Plant	_____	_____	_____

Harvester Type Numbers, Time Available, and Tractors Used

ID Number	Type	Number of Machines	Hours Available Per Day Per Machine	Tractor Size ID Needed	Tractor Hours/ Machine Hour
1	Combine	_____	_____	_____	_____
2	Other Harv1	_____	_____	_____	_____
3	Other Harv2	_____	_____	_____	_____

B-21 ROTATIONS, CROP SETS, CROPS, AND COMMODITIES

You will use four related terms in B-21 as you define and describe your cropping system. These terms are *rotations*, *crop sets*, *crops*, and *commodities*. It's possible for the words *corn*, *beans*, or *wheat* to refer to any of these terms.

The authors created *rotations* so you can describe the order in which you grow crops or crop sets over a number of years. By using the correct combination of crops or crop sets, you have the opportunity to use rotations to recognize the following:

Rotation may affect yield; corn preceded by beans yields more than corn preceded by corn.

Rotation may affect costs; corn preceded by beans needs less nitrogen fertilizer and perhaps less insecticide than corn preceded by corn.

Rotation may affect tillage; corn preceded by beans may need less tillage.

The authors created *crop sets* to represent cases where more than one crop is grown on the same land in the same year. In B-21, one crop set is defined. This crop set is the **Wheat** grown preceding **DWBeans**, which is double-crop soybeans.

The authors provided for a total of twelve annual *crops* in B-21. Each crop has multiple planting periods and multiple harvesting periods to allow you to vary yields and harvest moisture content by planting date and harvest date. Crop names are listed on page 14. The authors made several bean crops and a popcorn crop. Finally, the authors made three crops called Other Crop 1, 2, and 3, which you can name and describe.

To use a crop or crop set in a rotation you must complete the necessary information on a crop operations page (pages 17-41), and enter the appropriate commodity price on page 11. *If you complete this information but do not include the crop in a multi-year rotation each such crop or crop set will become a one-crop rotation with "0" minimum acres and "99999" maximum acres.* For example, suppose you complete page 19 for BCorn (corn preceded by beans). Then, on page 41, be sure to create one or more multi-year rotations which include crop 5 (BCorn). Otherwise, BCorn could be grown as a one-crop (continuous corn) rotation.

Before you complete any of the crop operations pages (pages 17-41), complete page 15. Enter the rotation names and their crops or crop sets. Why? **In B-21, the solver picks the optimum acreage of the best rotations! Of course, for your first solution, you will enter only the acreages of each rotation you are now growing.** Once you have completed the rotations, you will know which crop pages (pages 17-41) will need to be completed.

Before completing the rotation information on page 15 read the Guidelines on page 12, 13, and 14. The authors recommend that you specify the needed rotations on page 15 before deciding which of the crop operations pages (pages 17-41) to complete. Later, after you get a good solution for your present rotation acreages, you may want to add more rotations and crops.

Commodities refer to crops sold at the same price. The different corn, soybean, and wheat crops defined by the authors are combined into three corn, soybean, and wheat commodities. Enter your expected commodity prices on page 11.

EXPECTED COMMODITY PRICES

In B-21, several of the corn crops are the same commodity, all of the bean crops and all the wheat crops are the same commodity. Therefore, specify your expected prices for each commodity below.

Prices can reflect sales in three ways:

At harvest, elevator dried to 15% moisture corn, 13% wheat and beans.

At harvest, farm dried to 15% moisture corn, 13% beans.

For farm storage, farm dried to 15% moisture corn, 13% beans.

In your first plan, you may wish to specify prices for all commodities you might evaluate during the workshop. If necessary, you can change prices later.

You may have insufficient storage for all your commodities. The model is programmed to consider the most profitable use of your storage at harvest time. The authors think you shouldn't compare the harvest price directly with the price after storage, unless you reflect the opportunity cost of money. Therefore, calculate a time charge based on your expected harvest price and opportunity cost interest for the time between harvest and the stored crop sales date. Subtract this time charge from your expected stored commodity price to arrive at a harvest time equivalent price. For example, suppose you expect a \$2.40 March selling price. With a \$2.15 harvest price X 8% annual opportunity cost ÷ 12 months = \$.014 per month time charge. You would subtract .014 X 5 months = \$.07, and enter a farm storage price of \$2.33.

COMMODITY PRICES

Commodity	Harvest Price		Farm Stored Price
	Off Farm Dried	Farm Dried	
CCorn, BCorn, Wcorn	_____	_____	_____
BCorn-s (seed corn, waxy)	_____	_____	
BPop	_____	_____	
CBeans(wr), CBeans(nr), BBeans(wr), DW/Beans	_____	_____	_____
Wheat	_____	_____	
Other Crop1 (ex. silage)	_____ ¹	_____ ¹	
Other Crop2	_____ ¹	_____ ¹	
Other Crop3	_____ ¹	_____ ¹	

¹ Enter prices here ONLY for page 37, 39, 41 crops identified as "Other," type 4. Do not enter prices here for commodity types corn (1), beans (2), or wheat (3) on page 37, 39, 41.

GUIDELINES FOR ROTATIONS ON PAGE 15

On page 15, you are asked to:

1. Create names for your *rotations*. See suggestions on page 14.
2. Identify *crop and/or crop set* numbers for each rotation. Find the numbers on page 14.
3. For your first solution, enter your present acres of each rotation in the maximum acres column. (On later solutions, be sure to remove these maximum values by entering 999.99 to obtain the crop mix that will maximize the return to resources.)

Here is an example for a two year rotation with 200 acres of corn and 200 acres of beans each year:

<u>Rotation Name</u>	<u>Minimum Acres</u>	<u>Maximum Acres</u>	<u>Crop or Crop Set Numbers</u>
<u>BCorn-CB(wr)</u>	_____	<u>400</u>	<u>5</u> <u>11</u> _____

On the left, the name indicates a two crop rotation. On the right, entering two crop numbers signals the solver this is a two crop rotation. As shown on page 14, crop 5 is BCorn which is corn preceded by beans. Crop 11 is CBeans(wr) which is "Planter" beans preceded by corn.

Single crop rotations (i.e., corn preceded by corn, and beans preceded by beans) should be entered as a two-year rotation. For example,

<u>Rotation Name</u>	<u>Minimum Acres</u>	<u>Maximum Acres</u>	<u>Crop or Crop Set Numbers</u>
Cont. Corn	_____	_____	<u>3</u> <u>3</u> _____
Cont. Beans	_____	_____	<u>13</u> <u>13</u> _____

Suggested Order For Entering Your Rotations

You can enter up to 20 rotations. Up to 10 of them can be either three or four years in length. The rest can be one or two years long. Note the number of cells on each rotation row on page 15. Note that the first 10 rows have four cells and should be used for your three or four year rotations. When you enter a crop or crop set number, you indicate a crop in that rotation.

For your first solution, create rotations that will grow your current crops. For this *solution*, your goal could be to study mainly "timeliness". Then, if you have a timeliness problem, test alternative ways to solve it, such as using a different size machine.

For later solutions, you may want to test new rotations, and perhaps new crops, as you test ways to increase your returns.

(Continued on page 13)

Rotation by Default

Because of the way the computer program is written, each crop defined on a crop operations page will automatically become a one-crop rotation, UNLESS you include it in a multi-crop rotation.

Maximum Acres Total

For your first solution, add the acres you entered in the maximum acre limits column on page 15. It should equal the number of cropland acres you entered on page 5. If not, re-figure your rotation acre entries until the maximum acreage total equals your page 5 acreage.

Rotation Acre Limits on Later Solutions

After you get a good "present acres" solution, you will likely delete your present acres from the maximum acre limit cells and put in larger maximum limits, on page 15, such as 99999. By doing this, you allow the solver to find the most profitable crop mix.

Later, you could create rotations which include crops you might want to grow or new rotations of your current crops or you could also create rotations with sequences of crops grown with alternative cropping operations, such as no-till, to see if the solver will select any acreage of these rotations.

ROTATION NAMES, CROP NUMBERS, AND ACRE LIMITS

Enter rotation names in the left column of page 15. Create a name for each rotation you now have. Later, you may want to add more rotations for the solver to consider. Use any combination of up to 15 characters; except, don't use "/". Start with your multi-year rotations. Consider names like:

Possible Rotation Names

BC-CC-CB(wr)	for 3 year BCorn, CCorn, CBean(wr)
BC-CB(wr)-Wht	for 3 year BCorn, CBean(wr), Wheat
WCorn-WhtDWB	for 2 year WCorn, Wht-DWBeans
BCorn-CB(wr)	for 2 year BCorn, CBeans(wr)
BCorn-CB(nr)	for 2 year BCorn, CBeans(nr)
Cont. Corn	for continuous corn CCorn, CCorn
Cont. Beans	for continuous beans BBeans, BBeans

Note: Your rotation names will be printed in your solution.

For each rotation you name on page 15, enter the appropriate crop number or numbers in the cells on the right side of each rotation line. Select crop numbers from the following list which includes 12 single crops and one double crop set. (Then enter the "crop operations" for your crops on the page in parenthesis.)

Crops¹

- | | | |
|----|---------------------------|--|
| 1. | Wht-DW Beans ¹ | Wheat and double-crop beans (page 25 and page 33) |
| 3. | CCorn | Corn preceded by corn (page 17) |
| 5. | BCorn | Corn preceded by beans (page 19) |
| 7. | WCorn | Corn preceded by wheat (page 21) |
| 8. | BCorn-s | Specialty corn of your choice, such as seed corn, waxy (page 23) |
| 9. | Wheat | Wheat preceded by any crop (page 25) |

User Defined Crops

- | | | | |
|-----|------------|---|----------------------------|
| 11. | CBeans(wr) | "Planter" beans preceded by corn (page 27) | 16. Other Crop 1 (page 37) |
| 12. | CBeans(nr) | "Drill" beans preceded by corn (page 29) | 17. Other Crop 2 (page 39) |
| 13. | BBeans | Planter" or "Drill" beans preceded by beans (page 31) | 18. Other Crop 3 (page 41) |
| 14. | BPop | Popcorn preceded by any crop (page 35) | |

For your first solution, enter your present acres in the maximum acres cell for each rotation on page 15. This forces the solver to try to grow your present crop acreages. The solver must grow exactly the same number of acres of each crop or crop set in a rotation.

For later solutions, you may want to let the solver find your best crop mix. Do this by increasing or eliminating your maximum acres limits and also by creating additional rotations. Get a special input form from your teaching assistant to limit acreage of a crop instead of a rotation.

¹ Crop 1 is a double crop set which includes Wheat and DWBeans.

CROP OPERATIONS

Describe the production system for each crop you grow, or want to consider producing, beginning on page 13 for **CCorn**. Indicate machinery operations, per acre yields, and variable costs. Note that jobs are divided into land preparation, planting, post-planting and harvesting phases.

For all four phases of production, you are asked the following questions:

1. Machine Type. Describe the machinery field work you do for each crop by using the machinery ID numbers found on page 9. You know the preceding crop. Therefore, you can indicate the type of tillage you do on corn stalks or bean stubble.
2. Working Rate. Indicate the working rate in acres per hour for each machine type you use.
3. Labor Hours Per Machine Hour. For planters and harvesters, you should input the number of persons needed to operate each machine. Include more than 1.0 if more than one person is involved per planter or harvester.

For land preparation, indicate the *number* of the time period you are willing to have each job begin. Also indicate the time period number by which you insist that each job must be completed. *Use the period numbers on page 7 to indicate beginning period and ending period for each land preparation operation.* Include all field operations you or your employees do prior to planting in the order you do them. Land prep begins with the first tillage or fertilizing operation after the harvesting of the previous crop.

Be sure that the last land preparation task before planting *can begin on or before* the first planting period for the crop. For example, if you use yield adjustment set 1, corn planting can begin on April 22 (time period 2). Therefore, the beginning period for the last land preparation activity should be no later than time period 2. The ending period for the last land prep activity should be no later than the last planting period; in this case, period 8.

As shown on pages 43-47, the yield adjustment sets for corn, beans, wheat, double crop beans, canola, barley, (and for up to three sets you create for any crop) indicate the planting periods and harvesting periods for each crop, plus the relative yield for each plant/harvest period. If you wish, you can replace any of the yield adjustment set numbers already placed on each crop input page.

The planter used with each crop is also specified in the input form. While you "could" use a corn planter or drill for any crop, you are expected to use the corn planter (planter ID 1) for all corn crops and for all wide row (wr) bean crops. You are expected to use the drill for all narrow row (nr) bean crops, and for all wheat crops. To change the specified planter, cross out the number on the input form and write in the new planter ID number.

For each post-planting operation, indicate the number of weeks after planting that the job can be started. For the first post-planting job, indicate how many weeks are available to complete this one job, up to a maximum of 3. If this job is delayed all other following jobs will be delayed by the same number of weeks. It is recommended that "1" week be used as the entry in "Weeks to complete."

To describe harvest, indicate the appropriate harvester type, working rate and labor requirement. In the harvest section, also indicate your expected average yield in bushels/acre for your best plant/harvest period. Yield and moisture by plant/harvest period will be adjusted using the crop yield adjustment and moisture percentage shown on pages 43-47.

Next, add your per acre crop costs for seed, fertilizer, chemicals, custom application, and other direct costs such as crop insurance, misc., and interest on these variable costs. Also estimate your per acre tractor and harvester fuel plus your repairs.

CROP OPERATIONS¹
CCorn — Corn following corn. (Crop #3)

Machinery Operations

		Use Page 7 Period Number			
	Machine Type ID No.	Beginning Period	Ending Period	Working Rate Acres Per Hour	Labor Hours Per Machine Hour
Land Preparation	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
Planting	Yield adjustment set? <u> 1 </u> ^{1,2}				
	<u> 1 </u> ^{1,2}			<u> </u> ¹	<u> </u>
Post-Plant		Job can begin weeks after plant	Weeks to complete		
	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
Harvest		Expected Yield			
	<u> </u> ¹	(158) <u> </u> ¹		<u> </u> ¹	<u> </u>

What is your per acre cost for seed, fertilizer, lime, chemicals, hauling, interest, insurance, misc.?

(187) \$ _____

What is your per acre cost for tractor and harvester fuel and repairs? (25) \$ _____

¹ Required entries to grow a crop include: Yield Adjustment Set number and Expected Yield, Planter number and Working Rate, Harvester number and Working Rate.

² Yield adjustment set 1 allows corn to be planted from April 22 to June 6 and harvested from September 20 to December 5. The "1" in the machine type ID No. column indicates the corn planter is used.

SUITABLE FIELD DAYS AND DAYS WORKED EACH WEEK MACHINERY RESOURCES

Period Number	Time Period	Period Length	Default	ID Number	Tractor Size
		Good Field Days			
1	December 6-April 21	19½ Weeks	9.3	1	Big Tractors
				2	Small Tractors
2	April 22-April 25	½ Week	1.3	<i>Tillage and Post-Planting Machine type</i>	
3	April 26-May 2	1 Week	2.4	ID Number	Type
4	May 3-May 9	1 Week	2.4	1	P & K Spreader
5	May 10-May 16	1 Week	3.1	2	Plow
6	May 17-May 23	1 Week	3.1	3	Chisel
7	May 24-May 30	1 Week	3.8	4	Anhydrous
8	May 31-June 6	1 Week	3.8	5	Disc
9	June 7-June 13	1 Week	3.5	6	Field Cultivator
10	June 14-June 20	1 Week	3.5	7	Sprayer
11	June 21-June 27	1 Week	3.5	8	Rotary Hoe
12	June 28-July 4	1 Week	3.5	9	Cultivator
13	July 5-July 11	1 Week	3.5	10	Other
14	July 12-August 29	7 Weeks	29.0	<i>Planter Type</i>	
15	August 30-Sept 19	3 Weeks	12.3	ID Number	Type
16	Sept 20-Sept 26	1 Week	4.2	1	Corn Planter
17	Sept 27-October 10	2 Weeks	8.2	2	Drill
18	Oct 11-Oct 31	3 Weeks	12.2	3	Other Plant
19	Nov 1-Nov 14	2 Weeks	8.1	<i>Harvester Type</i>	
20	Nov 15-December 5	3 Weeks	9.9	ID Number	Type
				1	Combine
				2	Other Harv 1
				3	Other Harv 2

CROP OPERATIONS¹
Bcorn — Corn preceded by beans. (Crop #5)

Machinery Operations

		Use Page 7 Period Number			
	Machine Type ID No.	Beginning Period	Ending Period	Working Rate Acres Per Hour	Labor Hours Per Machine Hour
Land Preparation	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Planting	_____	_____	_____	_____	_____
	Yield adjustment set? <u> 1 </u> ^{1,2}				
	<u> 1 </u> ^{1,2}			<u> </u> ¹	
Post-Plant	_____	Job can begin weeks after plant	Weeks to complete	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
Harvest	_____	Expected Yield (176) _____ ¹		_____	_____

What is your per acre cost for seed, fertilizer, lime, chemicals, hauling, interest, insurance, misc.?

(170) \$ _____

What is your per acre cost for tractor and harvester fuel and repairs? (25) \$ _____

¹ Required entries to grow a crop include: Yield Adjustment Set number and Expected Yield, Planter number and Working Rate, Harvester number and Working Rate.

² Yield adjustment set 1 allows corn to be planted from April 22 to June 6 and harvested from September 20 to December 5. The "1" in the machine type ID No. column indicates the corn planter is used.

CROP OPERATIONS¹

Cbeans(nr) — Beans, preceded by corn, planted with the drill. (Crop #12)

Machinery Operations

		Use Page 7 Period Number			
	Machine Type ID No.	Beginning Period	Ending Period	Working Rate Acres Per Hour	Labor Hours Per Machine Hour
Land Preparation	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Planting	Yield adjustment set? <u> 2 </u> ^{1,2}				
	<u> 2 </u> ^{1,2}			_____ ¹	_____
Post-Plant		Job can begin weeks after plant	Weeks to complete		
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Harvest³		Expected Yield			
	_____ ¹	(58) _____ ¹		_____ ^{1,3}	_____ ³

What is your per acre cost for seed, fertilizer, lime, chemicals, hauling, interest, insurance, misc.?

(97) \$ _____

What is your per acre cost for tractor and harvester fuel and repairs? (25) \$ _____

¹ Required entries to grow a crop include: Yield Adjustment Set number and Expected Yield, Planter number and Working Rate, Harvester number and Working Rate.

² Yield adjustment set 2 allows beans to be planted from April 26 to June 13 and harvested from September 20 to December 5. The "2" in the machine type ID column indicates a drill is used.

³ Because of dew, etc., you may harvest beans fewer hours per day than corn. For directions on adjusting the harvest working rate and labor hours per machine hour to represent this difference, see the last paragraph on page 8.

DEFINING OTHER CROP 1, 2, 3

By entering the appropriate information on one of the OTHER CROP OPERATIONS PAGES, you can name a crop. If you answer "4" to the commodity type, be sure that a price for this crop is specified on page 11. These crops can be used in single crop or multiple year rotations.

CROP OPERATIONS¹

Other Crop1 (Crop #16)

Name it (up to 15 letters) _____

What commodity type for pricing: Corn(1), Beans(2), Wheat(3), Other(4) _____
 For type "4", enter the expected price on page 11.

Machinery Operations

Use Page 7 Period Number					
	Machine Type ID No.	Beginning Period	Ending Period	Working Rate Acres Per Hour	Labor Hours Per Machine Hour
Land Preparation	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____

Planting Yield adjustment set? _____¹
 _____¹ _____¹ _____

	Job can begin weeks after plant	Weeks to complete	
Post-Plant	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Harvest _____¹ Expected Yield
_____¹ _____¹ _____

What is your per acre cost for seed, fertilizer, lime, chemicals? \$_____

What is your per acre cost for tractor and harvester fuel and repairs? \$_____

Is this crop dried using the farm dryer (1 = Yes; 2 = No)? _____ Final moisture content _____%

¹Required entries to grow a crop include: Yield Adjustment Set number and Expected Yield, Planter number and Working Rate, Harvester number and Working Rate.

CROP OPERATIONS¹

Other Crop² (Crop #17)

Name it (up to 15 letters) _____

What commodity type for pricing: Corn(1), Beans(2), Wheat(3), Other(4) _____

For type "4", enter the expected price on page 11.

Machinery Operations

Use Page 7 Period Number					
	Machine Type ID No.	Beginning Period	Ending Period	Working Rate Acres Per Hour	Labor Hours Per Machine Hour
Land Preparation	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____

Planting Yield adjustment set? _____¹
 _____¹ _____¹ _____

	Job can begin weeks after plant	Weeks to complete		
Post-Plant	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

Harvest _____¹ Expected Yield
_____¹ _____¹ _____

What is your per acre cost for seed, fertilizer, lime, chemicals? \$ _____

What is your per acre cost for tractor and harvester fuel and repairs? \$ _____

Is this crop dried using the farm dryer (1 = Yes; 2 = No)? _____ Final moisture content _____%

¹Required entries to grow a crop include: Yield Adjustment Set number and Expected Yield, Planter number and Working Rate, Harvester number and Working Rate.

CROP OPERATIONS¹

Other Crop³ (Crop #18)

Name it (up to 15 letters) _____

What commodity type for pricing: Corn(1), Beans(2), Wheat(3), Other(4) _____
 For type "4", enter the expected price on page 11.

Machinery Operations

Use Page 7 Period Number					
	Machine Type ID No.	Beginning Period	Ending Period	Working Rate Acres Per Hour	Labor Hours Per Machine Hour
Land Preparation	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____

Planting Yield adjustment set? _____¹
 _____¹ _____¹ _____

	Job can begin weeks after plant	Weeks to complete		
Post-Plant	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

Harvest _____¹ Expected Yield
_____¹ _____¹ _____

What is your per acre cost for seed, fertilizer, lime, chemicals? \$ _____

What is your per acre cost for tractor and harvester fuel and repairs? \$ _____

Is this crop dried using the farm dryer (1 = Yes; 2 = No)? _____ Final moisture content _____%

¹ Required entries to grow a crop include: Yield Adjustment Set number and Expected Yield, Planter number and Working Rate, Harvester number and Working Rate.

YIELD ADJUSTMENT SETS

For each crop on pages 17-41, you indicated your expected yield for the best plant/harvest period. You also indicated a yield adjustment set. The yield adjustment set defines the beginning and ending periods for planting and harvesting. It also indicates the yield adjustment percentages and harvest moisture content by plant/harvest periods. Yield adjustment percentages represent the percentage of the best yield that will be received in each specific plant/harvest period. To obtain the expected yield for each plant/harvest period, the yield for the best plant/harvest period is multiplied by the yield adjustment percentage for each plant/harvest period.

The yield adjustment percentages and moisture content used for yield adjustment sets 1 to 6 are shown on pages 43-45. You can make changes to each of these yield adjustment sets or you may define an entirely new yield adjustment set by following the instructions below.

Changes for an existing yield adjustment set

A change to an existing yield adjustment set is made by completing the YIELD ADJUSTMENT SET CHANGE FORM on page 47. The first item that must be completed is the set number for which changes are being made. This could be set 1 to 6. Remember a change to one of these yield adjustment sets will affect all crops using that set. Unless you change the required yield adjustment set, changes to each yield adjustment set will affect the following crops:

<u>Yield Adjustment Set</u>	<u>Crops Affected</u>
1. Corn	CCorn, BCorn, WCorn, BCorn-s, BPop
2. Beans	CBeans(wr), CBeans(nr), BBeans
3. Wheat	Wheat
4. DCBeans	DW/Beans
5. Canola	Canola
6. Barley	Barley

Using the change form, you can change planting periods, harvesting periods, the yield adjustment percentage, and the moisture content at harvest. When altering planting and/or harvest periods, remember planting can occur in a maximum of seven periods and harvest in a maximum of five periods. Use the list of time periods on page 7 to find the period numbers for planting and harvest. When making a change, you only need to indicate those items that change. You do not need to repeat values that remain unchanged.

Defining a new yield adjustment set

The YIELD ADJUSTMENT SET CHANGE FORM on page 47 can also be used to define a new adjustment set. When defining a new yield adjustment set, the first items to provide are the set numbers and description. Set numbers for a new yield adjustment set are limited to 7, 8, or 9. Use a crop name for the description.

Next indicate the planting periods. Use the list of time periods on page 7 to find the period numbers for the earliest and latest planting period. There is also a space for providing a verbal description of that period if you wish to complete it. This entry will not be used by the computer but can remind you which periods you want to use. After selecting the beginning and ending periods for planting, indicate the same information for harvest periods. There can be a maximum of seven different planting periods

and a maximum of five different harvest periods.

Next, complete the yield adjustments for each possible plant/harvest period combination. If the yield will be the same as in the best plant/harvest period, then a 100 would be entered. If the yield will be only 90% of that received in the best period, enter 90. If the planting-harvesting period combination will not allow the crop to mature or you do not want that combination considered, enter zero (0).

Finally, enter the moisture content for each plant/harvest period if the crop will be dried using either an on-farm dryer or off-farm dryer. If the crop will not be dried, this part of the table does not need to be completed.

Set: 1 Crops: CCorn ¹ , CCorn(nd), BCorn, BCorn(nd), BCorn-s, BPop					
Earliest Possible:			Latest Possible:		
Planting Period	2	April 22-25	Planting Period	8	May 31-June 6
Harvest Period	16	Sept 20-26	Harvest Period	20	Nov 15-Dec 5
Harvest Periods					
Planting Periods	Sept 20 to Sept 26	Sept 27 to Oct 10	Oct 11 to Oct 31	Nov 1 to Nov 14	Nov 15 to Dec 5
Yield Adjustment in Percent					
Apr 22-25	90 ²	96	94	90	85
Apr 26-May 2	0 ³	100	98	94	89
May 3-9	0	95 ⁴	98	94	89
May 10-16	0	92 ⁴	94	90	85
May 17-23	0	0	84 ⁴	84	79
May 24-30	0	0	74 ⁴	74	69
May 31-June 6	0	0	0	0	56
Moisture Content in Percent					
Apr 22-25	30	28	24	21	20
Apr 26-May 2		30	24	22	20
May 3-9		28 ⁴	26	23	21
May 10-16		30 ⁴	28	24	21
May 17-23			26 ⁴	26	22
May 24-30			28 ⁴	29	23
May 31-June 6					26

¹ Source: Estimating Potential Yield for Corn, Soybeans and Wheat, D. H. Doster, S. D. Parsons, D. R. Griffith, R. L. Nielsen, M. L. Swearingen, Purdue ID-152 (rev. 7-93).

² This yield coefficient assumes a short season variety and thus a lower yield potential.

³ A "0" yield percentage indicates that this combination of planting and harvest periods should not be considered in the model. Use the yield adjustment change form to change these values.

⁴ These yield and moisture coefficients assume a medium season variety.

Set: 2 Crops: Beans (wr) and (nr)

Earliest Possible:		Latest Possible:	
Planting Period	3 April 26-May 2	Planting Period	9 June 7-13
Harvest Period	16 Sept 20-26	Harvest Period	20 Nov 15-Dec 5

Harvest Periods

Planting Periods	Sept 20 to Sept 26	Sept 27 to Oct 10	Oct 11 to Oct 31	Nov 1 to Nov 14	Nov 15 to Dec 5
------------------	--------------------------	-------------------------	------------------------	-----------------------	-----------------------

Yield Adjustment in Percent

Apr 26-May 2	92	98	96	93.5	89
May 3-9	92.1	98.1	96.1	93.6	89.1
May 10-16	0	100	98.1	96.1	91.1
May 17-23	0	99.9	98	96	91
May 24-30	0	0	94	92.5	89
May 31-June 6	0	0	90	88.5	85
June 7-13	0	0	85	83.5	80

Moisture Content in Percent¹

Apr 26-May 2	13	13	13	13	13
May 3-9	13	13	13	13	13
May 10-16		13	13	13	13
May 17-23		13	13	13	13
May 24-30			13	13	13
May 31-June 6			13	13	13
June 7-13			13	13	13

¹ Because almost no Indiana farmers dry soybeans, harvest moisture coefficients are set at 13%. If you wish to change these coefficients, use the YIELD ADJUSTMENT SET CHANGE FORM.

Set: 3 Crops: Wheat, Wheat (nd)

Earliest Possible:		Latest Possible:	
Planting Period	17 Sept 27-Oct 10	Planting Period	18 Oct 11-31
Harvest Period	9 June 7-13	Harvest Period	13 July 5-11

Harvest Periods

Planting Periods	June 7 to June 13	June 14 to June 20	June 21 to June 27	June 28 to July 4	July 5 to July 11
------------------	-------------------------	--------------------------	--------------------------	-------------------------	-------------------------

Yield Adjustment in Percent

Sept 27-Oct 10	0	0	100	100	100
Oct 11-31	0	0	98	98	98

Moisture Content in Percent

Sept 27-Oct 10	0	0	22	15	13
Oct 11-31	0	0	24	17	15

Set: 4 Crops: DCBeans

Earliest Possible:			Latest Possible:		
Planting Period	9	June 7-13	Planting Period	13	July 5-11
Harvest Period	18	Oct 11-31	Harvest Period	20	Nov 15-Dec 5

Harvest Periods			
Planting Periods	Oct 11 to Oct 31	Nov 1 to Nov 14	Nov 15 to Dec 5

Yield Adjustment in Percent			
June 7-13	144	142	137
June 14-20	132	130	125
June 21-27	117	115	112
June 28-July 4	100	98	93
July 5-11	0	78	75

Moisture Content in Percent			
June 7-13	13	13	13
June 14-20	13	13	13
June 21-27	13	13	13
June 28-July 4	13	13	13
July 5-11		13	13

Set: 5 Crops: Canola

Earliest Possible:			Latest Possible:		
Planting Period	15	Aug 30-Sept 19	Planting Period	15	Aug 30-Sept 19
Harvest Period	11	June 21-27	Harvest Period	12	June 28-July 4

Harvest Periods		
Planting Periods	June 21 to June 27	June 28 to July 4

Yield Adjustment in Percent		
Aug 30-Sept 19	100	100

Moisture Content in Percent		
Aug 30-Sept 19	11	11

Set: 6 Crops: Barley

Earliest Possible:			Latest Possible:		
Planting Period	16	Sept 20-26	Planting Period	18	Oct 11-31
Harvest Period	9	June 7-13	Harvest Period	13	July 5-11

Harvest Periods					
Planting Periods	June 7 to June 13	June 14 to June 20	June 21 to June 27	June 28 to July 4	July 5 to July 11

Yield Adjustment in Percent					
Sept 20-26	0	100	100	100	100
Sept 27-Oct 10	0	100	100	100	100
Oct 11-31	0	98	98	98	98

Moisture Content in Percent					
Sept 20-26	0	22	15	13	13
Sept 27-Oct 10	0	22	15	13	13
Oct 11-31	0	24	17	15	13

YIELD ADJUSTMENT SET CHANGE FORM

Set: _____ Crops: _____

Earliest Possible: Planting Period _____ Harvest Period _____	Latest Possible: Planting Period _____ Harvest Period _____
---	---

	<u>Harvest Periods</u>				
Planting Periods	_____	_____	_____	_____	_____
	to	to	to	to	to
	_____	_____	_____	_____	_____

<u>Yield Adjustment in Percent</u>					
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

<u>Moisture Content in Percent</u>					
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

RESOURCE CHARGES OR INDIRECT COSTS

You may leave any or all of these cells blank. Why? Charges for fixed labor, land and machinery resources are not used by the linear program solver to determine your most profitable plan. The solver selects that combination of your crop rotations that results in the largest Return to Resources, also called Total Contribution Margin. Resource charges for owned resources such as land, labor, and machinery and land that is already rented don't count when the LP solver determines the best rotation mix.

If you choose to enter amounts for any of your present permanent labor, land, machinery or improvements, your values will be merely be subtracted from total Contribution Margin (Returns to Resources).

Why might you decide to enter some amounts? Perhaps you are thinking about testing one or more alternative plans with B-21 where you will use a different size machine. In each of those plans, you will enter a different machinery working rate on appropriate crop pages.

You also need to account for the change in ownership costs that arises from changing your resources. One way is to enter an annual charge for all machines on input form page 49. Rather than entering charges for all your machinery and other resources on page 49, consider entering charges only for, say, the machinery that you may change when making other B-21 runs.

Keep in mind that B-21 is only a partial budget. You don't enter information about your other income sources or your financing. Therefore, when you compare B-21 plans, you will note whether or not the difference is enough to justify changing your resources.

ADDITIONAL LAND RENTAL

Question 1 and 2. Leave added land rental at zero on your first plan. Why? Before you consider more acres, you will want to study your solution describing the best crops to raise for your present farm size and your other resources. Are you untimely or too timely? You may interpret your first plan solution shadow price signals to suggest you are too timely on your present acreage.

In later plans, you may decide to consider, say, 5% or 10% additional rental acres in question 1. The computer is programmed to rent in acres, one at a time, provided you have sufficient machinery and labor resources, and provided your returns will increase more than your costs, including your direct costs for seed, fertilizer and chemicals, fuel and repairs, and the per acre cash rent you provide in question 2. Unless it uses all your available rental in acres, or all your machinery or labor resources, the computer will continue renting in acres, one at a time, as long as your returns increase. Therefore, if you enter a large number of acres available, your next solution may show too many shadow prices for a timely farming operation.

Even though your returns increase with each rental acre farmed, you may decide to submit another input form. Based on your new knowledge about resource shadow prices, you may test to see if extra returns from use of a bigger planter or combine or some other change will be more than the extra costs for obtaining it.

RESOURCE CHARGES OR INDIRECT COSTS

Your answers will not affect the best plan as found by the linear program solver. You may leave them blank.

Charge for permanent labor, both unpaid or paid	\$ _____
Charge for present land, both owned and rented	_____
Charge for grain handling improvements	_____
Charge for machinery	_____

ADDITIONAL LAND RENTAL

1. How many additional acres are available to rent? (0) _____
2. What is the cash rent per acre on added land? (\$130) _____