Portable Punched Cards for Recording Tree Fruit Evaluations

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In 1961 portable punched cards, previously used by cotton investigators, were adapted to collection of data on stone fruit seedlings in the field (1). In subsequent years, several refinements in the format and content of the card have been added until a very usable, if not ideal, data collection system has evolved. With relatively minor changes, these cards could be adapted to evaluating many horticultural crops.

The punching board and accessories have not changed appreciably from those described in the earlier article. However, the prestamped cards shown in figure 3 of that article are now overprinted with appropriate headings and the 0 to 9 spaces in some columns are replaced by descriptive letters or measurements (fig. 1). The card is slipped under a transparent plastic template in the hand-held frame and is punched by means of a pen-sized stylus, as before.

Since all information desired on a seedling could not be punched into a single card and since a standard card will store data from two field cards (40 columns each), it was decided to use one card for fruit data and one for tree characteristics. A white card is used for fruit data (fig. 1) and a green one for tree characteristics (fig. 2).

On the fruit data card were compiled those characteristics which could be rated best when the fruit ripens. A card is completed for each seedling with ripe fruit on a particular evaluation day. No attempt to keep cards in strict order is necessary. The cards are filed snugly to prevent mutilation for later duplication or collation by machine. The evaluated seedling is

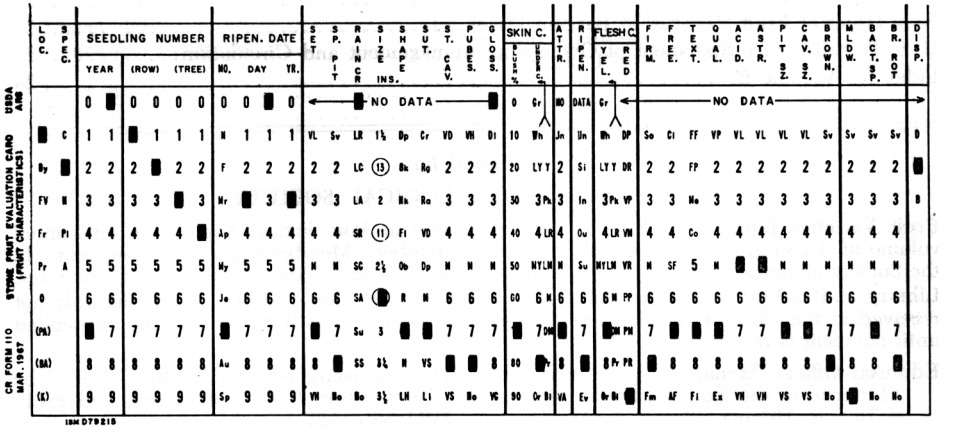

Figure 1. Fruit Characteristics Card (white)

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marked and is passed on later evaluation dates. A red plastic ribbon is used to indicate intention to propagate a seedling, while a white plastic ribbon marks it to be kept at least temporarily. A discard is marked by breaking a main leader into the center of the tree.

On the green card (fig. 2), are compiled characteristics which may be taken when the tree is dormant, at blossom time, or at convenient pre- or post-harvest times. A partially filled card is not returned to the field. Recordings are made only in appropriate columns for that evaluation period and another card is used for subsequent evaluations. Thus, it is not necessary to maintain any order of the cards or to search for specific numbers.

In table 1, the meaning of specific punches from zero to nine for each fruit characteristic is tabulated. The next-to-last column lists the punches made on an illustrative fruit data card (fig. 1) and the last column translates the punches to specific numbers, dates, measurements or descriptions. The seedling in question is a peach with the identification number 701234, ripening July 30 in 1973, and considered sufficiently promising to be observed another fruiting season. Similarly, table 2 gives the tree characteristics of the same peach seedling. In both tables, the one to nine numbers are successively more desirable ratings for a specific character unless otherwise noted.

The cards are designed to be as versatile as possible; hence, not all columns are applicable to each stonefruit species. In a few cases alternate ratings are available in a single column. For example, skin and flesh color of cherries or plums may not be rated on the same scale as color of peaches or apricots.

The zero spaces are reserved for indicating no data for a specific characteristic except for the seedling identification information, ripening date, percent blush, and fruit color columns. Generally, the lower numbers designate undesirable, and the higher ones more desirable, ratings. Exceptions to this are the seedling identification information, acidity and astringency (where intermediate ratings may be more desirable than either extreme), and some of the purely descriptive or measurement columns.

Reasonable care should be exercised in handling the cards. The cards are thin and easily spindled because of prestamping. Use of the optional card

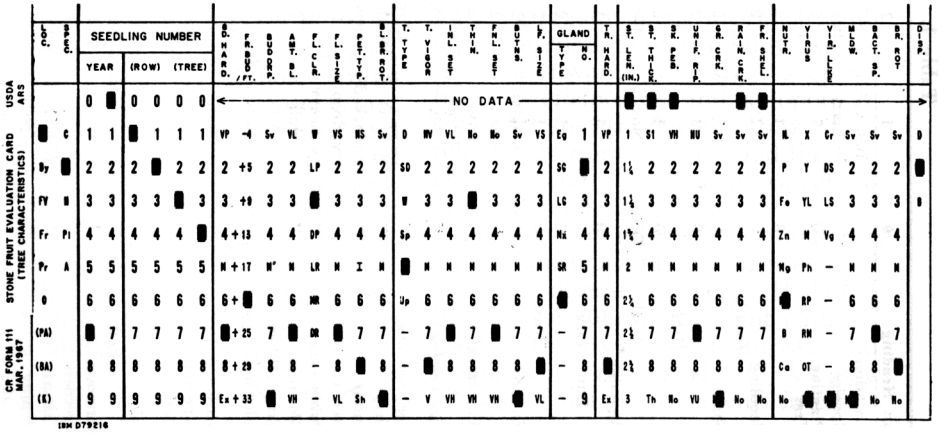

Figure 2. Tree Characteristics Card (green)

Table 1. Sample Marked Card—Fruit Characteristics (White card)

Column	Heading	0	1	2	3	4	5	6	7	8	9	Punch	Read out
2	Location		Beltsville	Byron	Fort Valley	Fresno	Prosser	Other				1	
4	Species		Cherry	Peach	Nectarine	Plum	Apricot					2	
6	Planting Year	0	1	2	3	4	5	6	7	8	9	7	
8		0	1	2	3	4	5	6	7	8	9	0	
10	Seedling (row)	0	1	2	3	4	5	6	7	8	9	1	
12	Number	0	1	2	3	4	5	6	7	8	9	2	1234
14	(tree)	0	1	2	3	4	5	6	7	8	9	3	
16		0	1	2	3	4	5	6	7	8	9	4	
18	Month	Oct.	Nov.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	7	
20	Ripening Date Day	0	1	2	3	4	5	6	7	8	9	3	July 30, 1973
22		0	1	2	3	4	5	6	7	8	9	0	
24	Year	0	1	2	3	4	5	6	7	8	9	3	
26	Fruit Set	no data	v. light	2	3	4	moderate	6	7	8	v. heavy	7	mod. heavy
28	Split pits	"	severe	2	3	4	"	6	7	8	none	8	v. few
30	Rain cracking	"	large radial	large concentric	large axial	small radial	small concentric	small axial	suture	stylar	none	0	not applicable
32	Size (inches) (or) row size	"	1½	1¾ 13 row	2 12 row	2¼ 11 row	2½ 10 row	2¾ 9 row	3	3¼	3½	6 —	2¾" diameter not applicable
34	Shape	"		beaked	necked	flat	obovate	round	ovate	heart	long heart	7	ovate
36	Suture	"	cracked	rough	raised	v. deep	deep	medium	shallow	v. shallow	line	7	shallow
38	Stem cavity	"	v. deep	2	3	4	medium	6	7	8	v. shallow	8	"
40	Pubescence	"	v. heavy	2	3	4	moderate	6	7	8	none	8	v. light
42	Glossiness	"	dull	2	3	4	medium	6	7	8	v. glossy	0	not applicable
44	Skin % blush	none	10	20	30	40	50	60	70	80	90-100	7	70%
46	color under-color	green no data	white	light yellow yellow	3 pink	4 light red	med. yellow lt. mahog.	6 mahogany	7 dk. mahog.	8 purple	orange black	8 —	bright yellow not applicable
48	Attractiveness	"	unattr.	2	3	4	medium	6	7	8	v. attr.	7	attractive
50	Ripening	"	uneven	one side	inner	outer	suture	6	7	8	even	8	even-ripening
52	Flesh Yellow color	green no data	white	lt. yellow yellow	3 pink	4 light red	med. yellow lt. mahog.	6 mahogany	7 dk. mahog.	8 purple	orange black	7 —	dark yellow not applicable
54	Red	"	diffuse pink	diffuse red	pink veins	med veins	red veins	pit pink	pit med.	pit red	none	9	none
56	Firmness	"	v. soft	2	3	4	medium	6	7	8	v. firm	8	firm
58	Freeness	"	cling	2	3	4	semi free	6	7	8	air free	7	freestone
60	Texture	"	flesh fibers	pit fibers	mealy	coarse	5	6	7	8	fine	7	med. fine
62	Quality	"	v. poor	2	3	4	medium	6	7	8	excellent	7	good
64	Acidity	"	v. low	2	3	4	"	6	7	8	v. high	5	medium
66	Astringency	"	"	2	3	4	"	6	7	8	"	5	"
68	Pit size	"	v. large	2	3	4	"	6	7	8	v. small	7	small
70	Cavity size	"	"	2	3	4	"	6	7	8	"	7	"

72	Flesh browning	"	severe	2	3	4	moderate	6	7	8	none	8	slight
74	Mildew	"	"	2	3	4	"	6	7	8	"	9	none
76	Bacterial spot	"	"	2	3	4	"	6	7	8	"	7	slight
78	Brown rot	"	"	2	3	4	"	6	7	8	"	8	slight
80	Disposition	"	discard	keep temp.	bud.							2	keep temporarily

Table 2. Sample Marked Card—Tree Characteristics* (Green card)

Column	Heading	0	1	2	3	4	5	6	7	8	9	Punch	Read out
18	Bud hardiness	no data	v. poor	2	3	4	medium	6	7	8	excellent	7	good
20	Fruit buds/foot	"	4 or less	5-8	9-12	13-16	17-20	21-24	25-28	29-33	33 or more	6	22/ft.
22	Bud drop	"	severe	2	3	4	moderate	6	7	8	none	9	None
24	Amt. of bloom	"	v. light	2	3	4	medium	6	7	8	v. heavy	7	mod. heavy
26	Flower color	"	white	lt. pink	med. pink	dk. pink	lt. red	med. red	dk. red			3	medium pink
28	Flower size	"	v. small	2	3	4	medium	6	7	8	v. large	7	large
30	Petal type	"	non-showy	2	3	4	intermed.	6	7	8	showy	8	showy
32	Blossom brown rot	"	severe	2	3	4	moderate	6	7	8	none	9	none
34	Tree type	"	dwarf	semidwarf	weeping	spreading	upright spread.	upright				5	upright-spreading
36	Tree vigor	"	non-vigor.	2	3	4	medium	6	7	8	vigorous	8	vigorous
38	Initial set	"	v. light	2	3	4	"	6	7	8	v. heavy	7	mod. heavy
40	Thinning	"	none	light	3	4	"	6	7	8	v. heavy	3	light
42	Final set	"	none	"	3	4	"	6	7	8	"	7	mod. heavy
44	Buttons	"	severe	2	3	4	moderate	6	7	8	none	9	none
46	Leaf size	"	v. small	2	3	4	medium	6	7	8	v. large	8	large
48	Gland type	"	eglandular	small globose	large globose	mixed	small reniform	large reniform				6	large, reniform
50	No. of glands	"	1	2	3	4	5	6	7	8	9	2	2 per leaf
52	Tree hardiness	"	v. poor	2	3	4	medium	6	7	8	excellent	8	good
54	Stem length	"	1 inch	1¼	1½	1¾	2	2¼	2½	2¾	3	0	n.a. (cherry)
56	Stem thickness	"	slender	2	3	4	medium	6	7	8	thick	0	n.a.
58	Skin pebbliness	"	v. heavy	2	3	4	"	6	7	8	none	0	n.a. (apricot)
60	Unif. of ripening	"	non-uniform	2	3	4	"	6	7	8	v. uniform	7	uniform
62	Growth cracks	"	severe	2	3	4	moderate	6	7	8	none	9	none
64	Rain cracking	"	"	2	3	4	"	6	7	8	"	0	n.a.
66	Fruit shelling	"	"	2	3	4	"	6	7	8	"	0	n.a. (cherry)
68	Nutrition disorder	"	nitrogen	phosphorus	iron	zinc	magnesium	manganese	boron	calcium	none	6	manganese defic.
70	Virus disease	"	x-disease	yellows	yellow leafroll	mosaic	phony	ring pox	rusty mottle	other	"	9	none
72	Viruslike disease	"	crinkle	deep suture	leaf spot	variegation					"	9	none

*Columns 2-16 and 74-80 same as for table 1.

carrier attachment is recommended. There has been little difficulty, however, in getting the data from the field card onto standard cards by machine. It was found advisable to use the standard cards for machine calculations.

Fruit cards have been used to collect data on 1131 peach and nectarine seedlings at Beltsville. From these cards, frequency distributions have been obtained for each cross and for each male and female parent. Percent of the combined progenies above selected thresholds of desirability for each characteristic were utilized to estimate the prepotency of specific selections as parents.

This system is best adapted when complete notes are taken at one time in the field and disposition of the individual seedling is determined at that time. If fruit must be collected and stored for a period before evaluation in the laboratory, as is the case for pears, the main advantages of this system are lost.

Literature Cited

1. Fogle, H. W. and E. Barnard. 1961. Punched cards as aids in evaluating seedlings in the field. Fruit Var. Hort. Dig. 15(3):47 50.

Book Review

Fruit Present and Future—Vol. II. The Royal Horticultural Society, Vincent Square London, SWip 2pe. 1973. 180 p. illus. £2.00 ($4.80).

Similar to Vol. I from the same society, Vol. II contains much practical information on varied horticultural topics such as: developing an orchard, variety trials, hardy fruits, pollination, bees in the orchard, systemic fungicides, apple breeding, tree dwarfing, small fruit culture, etc.

Another feature of this paper bound book is an article entitled "The Dwarf Fruit Tree Association of North America—Its Origin, Growth and Development" which covers 16 years' progress of a grower-oriented association. Also, the paper "The National Fruit Trials (1922-1972): A Brief History," depicting aims, organization, variety change and collections, could be of aid to the fruit breeder as well as to anyone working with pome and small fruits. The 28 articles, well illustrated, have much valuable and useful information for the pomologist and for students majoring in fruit production.

—ROBERT F. CARLSON