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THE MAKEUP AND VALUE OF EXHIBITS AT STATE AND COUNTY FAIRS

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The Ohio Experiment Station has probably tested the value and scope of fair exhibits as an educational agency as thoroughly as any agricultural institution of its kind in the country and far more thoroughly than most. The Station made an exhibit at the Cotton States Exposition in New Orleans in 1884, sending a collection of grasses. A more representative exhibition was given at the World's Fair at Chicago in 1893, several departments being represented. Another general and representative exhibit was made at the Paris Exposition. Exhibits seem to have been made at all the State Fairs since the Station was organized. The first exhibit, made at a county fair, was at Wooster in 1891. Exhibits were furnished to various county fairs according to the accidents of circumstances until 1905, in which year the general policy of making exhibits at the county fairs under an organized system was adopted.¹ During that year an exhibit was made at seven county fairs. The exhibit was shown at six fairs in 1906, at seven in 1907 and at eight in 1908. In 1909 there were two sets of exhibits, the one being practically a duplicate of the other, and it was therefore possible to show in two different counties on the same set of dates. Twenty fairs were visited this season, covering a total railroad mileage of 2108 miles.

In the beginning of the exhibition work, the displays were small and consisted of such products as might have been shown by any

¹ For fuller information regarding the exhibition work of the Ohio Station see Circular No. 101.

good specialists along agricultural and horticultural lines. Today the exhibit is large, as such displays are usually rated, and it is our special object to exhibit not only such products as were early shown, but to marshal in some manner in one impressive object lesson the cumulative results of years of uninterrupted investigation of specific problems. These exhibits, illustrating long period research, are best shown by the Departments of Soils and of Agronomy.

The space occupied by the Station Exhibit at the State Fair in 1909 was 96.5 x 73.5 feet. Along the walls, some of the exhibits, as in the case of the Department of Forestry, rose to a height of 50 to 60 feet. One of the table allotments was to the Department of Entomology and was about 60 feet long. This bench space, together with that across the ends of the table, gave us a table frontage of about 75 feet. The accompanying illustration, Plate 21, shows the general effect of the entomological exhibit. The enlarged bromide pictures seen in the illustration extended to a height of 10 or 12 feet from the platform, some spaces being left between the frames to enable the onlooker to catch a glimpse of the exhibits on the opposite walls; thus we thought to safeguard against any one leaving the hall under the impression that he had seen everything before he had seen one half of the complete exhibit shown by the Station. The Station supervisors of the exhibits usually demand a space equivalent to a tent not smaller than 40 x 60 feet as a condition for installing one of the county displays. The only expense imposed on the County Fair Associations as a condition for such installation is that they shall furnish sufficient space in a building or waterproof tent; that they shall thoroughly advertise it in advance of the fair; and that they shall defray all expenses of drayage and furnish carpenters and mechanics, as needed, to help put the exhibit in place; and again workmen to assist in tearing it down and packing it, at the conclusion of the fair.

Though, for a time, we were in some doubt as to the economy of this method of extension work, we have concluded that the results justify the expense. Certain it is that the general public take more kindly to this form of expenditure than to many others. The visual demonstration of results attained excite the interest and clinch the recollection in a way that can scarcely be attained by any other method of instruction. Many farmers now go to the State Fair for the express purpose of spending two or three days studying our exhibit and say that, in educational value, an examination of it rivals, or exceeds, a visit to the Station farm at Wooster. There is no other way by which we can get a visual demonstration of our work and its results before so many people in so short a time. The attendance at our State

Exhibit of the Department of Entomology of the Ohio Experiment Station at the State Fair

Fair ranges from 15,000 to 55,000 persons per day, most of whom give more or less attention to the Station's display. Also some of our county fairs are quite largely attended. The following figures record the admissions in round numbers to several of our county fairs at which our exhibits were shown in 1909. These figures are for the entire term of the fairs and not for single days:

39,000	9,000	20,000	26,000
15,000	19,000	9,000	30,000
25,000	16,000	19,000	21,000
			46,000

The admissions for a single day at one of these fairs were estimated to be 20,000, while the recorded admissions in one day at another exceeded 16,000. There is a somewhat greater probability that a larger percentage of the attendants at a county fair, than at the State Fair, will examine the Station's exhibit, because there are fewer other attractions to enter into competition with it. When we first commenced making these displays at county fairs, we sometimes had difficulty to hold our ground against the horse races, but our exhibition work has now been so generally exploited over the state that most of the visitors have their expectancy aroused and are curious to see the exhibit before they come to the fair. But the county fair visitors seem, on the whole, not quite so discriminating and more unlikely to comprehend the full significance of the exhibit, without help, than those composing the State Fair crowd. Many of our County Fair Associations now regard the Station Exhibit as one of their star attractions and one of the secretaries writes, in making application for the exhibit this year, that he would rather ask his association to pay \$200.00 for the exhibit than to miss having it again.

The entire work of arranging for and caring for these exhibitions is in the hands of the Department of Coöperative Experiments, and the only labor devolving upon the Department of Entomology in connection therewith is to prepare the Entomological Exhibit and keep it in repair from year to year. The repairs are usually comprised in the replacement of a number of damaged specimens, revarnishing some of the cases, cleaning up the glass entering into its makeup, and in like small, but tedious operations. The numbering and inventorying of the different pieces and of the shipping cases is all attended to by the Department of Coöperative Experiments according to a carefully devised system. In case of wreckage on the road, the inventory would furnish the basis of settlement for the damage claim, and in case new men are employed to work with the exhibit, they can

determine at once from the numbered pieces into what shipping cases or boxes they are meant to be packed. From a legal standpoint the Entomological Exhibit always remains the property of the Department of Entomology and, while the Department in charge of these Fair Exhibits is held accountable by the Station authorities for a careful administration of the trust committed to it, no legal claim for loss would obtain against the Coöperative Department for damage sustained by the exhibit while in its care.

Always at the State Fair, and occasionally at a county fair, some member or members of the entomological staff of the Station are present with the exhibit for the purpose of assisting in installing the same and to answer entomological queries; but at nearly all of the county fairs this work is performed by employes of the Coöperative Department, who try to acquaint themselves with the different features of the exhibit so as to be able to answer the questions most likely to be asked concerning it. Such questions as they are unable to answer are noted down, and sent to our office at Wooster, from which a reply is sent by mail. The large number of letters of inquiry we receive direct from constituents soon after the exhibit has been shown at their county fair, furnishes evidence that many people have learned for the first time that there is a public information bureau supported by the government and state, which they have a right to consult by mail for information which they previously supposed to be inaccessible to them.

Dismissing these preliminary observations of a general nature, let us now consider more specifically the Entomological Exhibit. We have not yet attained our ideal in the makeup of the display and probably never will fully reach it. We find it still more difficult to get a satisfactory setting-up of the different features in the space that often falls to us in county buildings and tents. We work toward the unit idea in preparing the exhibit, but questions of expediency constantly interfere with perfectly working out the plan. We try to group in one place, when setting up, those insects which affect small grains, again together those which affect fruits, and likewise, those which affect garden products, etc.; these displays again being subdivided into cases of insects which, for instance, attack wheat, or corn, or apples. So far as possible the enlarged bromide pictures are placed just behind and above the insect displays which illustrate similar subjects. However, other factors than those of mere utility have seemed to us to deserve more or less consideration in preparing and displaying such an exhibit. A case of brilliant butterflies and moths will sometimes cause the passerby to stop for a closer view, and he

generally then begins to look, with some interest, over the other cases which he would not have noticed at all had not his progress been arrested by this flash of color and beauty, which it would be very hard to fit into any special place in a purely utilitarian scheme. Our Riker series of life histories are especially serviceable in this way; yet any one who undertakes to build up a large collection of these life-histories will make slow progress if he does not take at once whatever offers and whenever it can be taken. As the collection enlarges one can, of course, discard the less interesting sets of mounts and can reach some sort of system in grouping them for exhibition. But though our collection has been the gradual accumulation of several years of work, we have thought best to use all material of this sort that we were able to prepare, notwithstanding the fact that the interest attaching to many of the sets is purely biological. The cotton boll weevil and the Texas fever tick are of little or no interest to the Ohio farmer from a utilitarian standpoint, but we had so many inquiries if we had them on exhibition that we have added the full life series of each, as well as of the gypsy moth and of the brown-tail moth, none of which are found in the state, but the latter two of which may appear in our borders at any time. Some of the sets have little value except as beautiful specimens and illustrations of purely biological principles. Again, in setting up the exhibit, we always give consideration to the æsthetic idea as well as to the utilitarian grouping scheme, and an effort is made to keep the general effect of the exhibit, as a whole, in harmonious balance. In fact the attractiveness of our exhibit is partially due to our steadfast resolution not to permit the economic idea or any other ironclad notion to completely dominate the makeup or the arrangement of the exhibit. It is difficult to properly distribute credit among the different workers whose ideas have entered into the composition of this display. To consider them chronologically, we must mention that a few cases were in order when the writer entered upon his duties as Entomologist of the Ohio Station, and there were evidences that some exhibition work had been prepared several years before this. Some of these old specimens are still in the exhibit and serviceable, though in new cases, and in new groupings to harmonize with the general plan of the expanded exhibit. Some good material was prepared under Professor Parrott's supervision and, transferred to new cases, is still in use. Mr. Houser has contributed some good pieces to it. Mr. Herbert T. Osborn has prepared most of the Riker life-history sets and many of the other cases of entomological specimens. His patient and painstaking labor upon it deserves high praise, for it carried to com-

pletion many cases that must have remained fragmentary except for his never-tiring perseverance. Mr. Goodwin has contributed so much to the exhibit, from many standpoints, that it would be hardly recognizable as the Ohio Entomological Exhibit if his work on it were eliminated. Most of the bromide enlargements were made by him, and the various mechanical contrivances by which it is quickly put into place and again torn down and quickly packed are, for the most part, the products of his ingenuity. The work of the writer upon it has consisted in giving it general direction, outlining the various features of which it should consist, suggesting and approving methods of working out the various details, etc.

Categorically considered the parts of the exhibit are as follows:

Insect Cases

There are 24 cases of insects in plain stained boxes 14 x 22 inches, papered inside and fitted with glass covers. (Fig. 1, Plate 22.) Six of these cases are duplicates, one set of six being with each of the two County Fair Exhibits, which as we have already stated, are shown at two different fairs on the same dates.

The contents of the cases are as follows:

1. Some Common Scale Insects.

Samples of fifteen named species are shown.

2. Scale Insects.

Twenty-eight specimens are shown, some of the samples being the same scale shown on different host plants.

3. San José Scale.

Wax models showing the life history stages of the insect, five pieces. Two additional wax models showing infested fruit of apple and pear. Infested twigs of apple and pear. Infested leaves of apple.

4. Bark Borers.

Life history series of *Scolytus rugulosus* and of *Phloeotribus liminaris*. Specimens showing characteristic work of each, and remedies and preventives for both shown on treated sticks of peach wood.

5. Shade Tree Pests.

Tussock Moth, all stages, Rosechafer, Cottonwood Leaf-beetle, Tulip Scale, etc.

6. Farm Crop Pests.

Wheat Jointworm; adults, larvæ, parasites and distorted straws.

Clover Root Borer; adults, pupæ and larvæ; specimens of injured roots pressed out by botanical driers. Chinch bugs; glued in large numbers to young corn plant, which has been pressed out by botanical driers. Vial of *Sporotrichum globuliferum* grown on corn meal and beef broth.

7 and 8. Insecticides.

Square, flat-sided bottles with curved necks are filled with insecticides and the corks are covered with red sealing wax. To illustrate the composition of sprays a vial is filled with each separate ingredient and another vial

1. Insect cases in position on racks; 2, Riker mount ready to fit into frame which holds a pair of mounts; 3, Riker frame in position on racks; 4, stationary magnifying glass under which small insects are shown.

holds the finished combination, the lot being grouped together. Printed directions for mixing the sprays cut from our spray calendar are pasted beneath each group of vials. Represented among these insecticides are ten poisons, one trap, four repellents, two fumigants and twelve contact insecticides. The vials are fastened in the cases by means of wires bent to fit over them and running through holes drilled in the bottom of the case. The wires are twisted together by means of pliers, and cut off on the outside. Some heavy paper and muslin serve to cover these little wire snags and thus prevent accidents.

9. Insects of the Black Locust.

Eight species and specimens of injury.

10. The Seventeen-year Cicada and different stages of the insect's life history and specimens of its injury. Also specimens of the Dog-day Cicada and examples of injury for comparison.

11. Some Beneficial Insects.

Dragon flies, lady beetles, tiger beetles, honey bees, bumble bees, lacewing flies, ground beetles, ichneumon flies, parasitic flies, etc.

12. Some Ohio Insects.

A partial type collection to illustrate the different orders and also including showy specimens to attract attention.

13. Some Insect Galls.

Specimens of galls made by several species of insects, among them the Grape Phylloxera.

14. Some Garden Insects.

Different stages of Colorado Potato Beetle, Striped Cucumber Beetle, Radish Maggot, Flea Beetles, Squash Bug, and others, with examples of their injuries.

15. Clover Root Borer.

Different stages of its life history, and examples of injury to roots and effect on tops.

16. Grain Insects.

Hessian fly in its different stages, snapping beetles and wireworms, Meal Snout Moth in different stages and examples of injury, Chinch Bugs, May Beetles and White Grubs, with samples of injured wheat and corn plants, including roots.

17. Catalpa Midge.

Different stages of insect and examples of damaged leaves, pods and shoots.

18. Educational Case.

Methods of preserving insects. Contains spreading board with butterflies of different sizes spread on it; cyanide killing bottle, vial of insect pins, cardboard points on pins and insects mounted on points, dissecting needles, punch for making points (a worn and discarded utensil) and miniature net. Methods of pinning and mounting different orders of insects are shown.

There are six additional cases which are practically duplicates of some of the foregoing. These are used for county fairs when two exhibits are shown at different fairs on the same dates.

Case Racks

Folding racks as shown in Fig. 1, Pl. 23, are set on tables to hold the cases. Each rack will hold four cases. (See Fig. 1, Pl. 22). Poplar wood, stained black, is used for their construction.

Riker Mounts

We use two sizes of these mounts, one 8 x 12 inches, the other $6\frac{1}{2} \times 8\frac{1}{2}$ inches. For inflated larvæ used in the Rikers we use an improvised "sarcophagus" or small glass tray like the one shown in the illustration, Fig. 2, Pl. 23, to prevent them from being crushed. This is made with glass slips, cut to proper size with a glass cutter and fastened at the edges and corners with strips of black passe partout or strips of lantern slide binding. The mounts are set by pairs into frames made for the purpose, as shown in Fig. 2, Pl. 22.

The framework of the frames is convex or rounded, as seen from the front, and is painted with black carriage paint and varnished. The back is exactly the same as in picture frames.

These mounts are set up on racks exactly like those used for the insect cases, except that they are somewhat smaller. Quite a common arrangement of these mounts for exhibition is shown in Fig. 3, Pl. 22.

A partial list of the mounts is as follows:

Large Mounts, 8 x 12

So far as possible the complete life series of each insect named is shown.

Frame 1 (2 mounts to each frame).	Frame 7.
{ Velleda Lappet Moth.	Winter Forms of Insect Life.
{ Tobacco Worm and Moth.	Question Sign Butterfly.
Bagworm or Basket Worm.	Frame 8.
Frame 2.	{ Walnut Datana.
Fall Canker Worm.	{ Apple Datana.
Elm Leaf Beetle.	Elm Leaf Beetle.
Frame 3.	Frame 9.
Grapeberry Worm.	Cotton Boll Weevil.
Raspberry Byturus.	Spring Canker Worm.
Frame 4.	Frame 10.
Winter Forms of Insect Life.	Abbott Sphinx.
Winter Forms of Insect Life.	Colorado Potato Beetle.
Frame 5.	Frame 11.
Gypsy Moth.	Cecropia Moth.
Brown-Tail Moth.	Promethea Moth.
Frame 6.	
Texas Fever Tick.	
Cotton Boll Weevil.	

Small Riker Mounts, $6\frac{1}{2} \times 8\frac{1}{2}$

Frame 1.	Frame 3.
Question-sign Butterfly.	Apple Datana Moth.
Imported Cabbage Butterfly.	Striped Cucumber Beetle.
Frame 2.	Frame 4.
Io Moth.	Saddleback Caterpillar.
Pipevine Swallowtail Butterfly.	Catalpa Sphinx Moth.

1. Rack for holding insect cases and Riker frames; 2, glass tray or "Sarcophagus" for holding inflated larvæ in Riker mounts; 3, case of nozzles and small spraying accessories; 4, rotary stand for photographs; 5, shipping case for racks like figure 1.

Frame 5.	Frame 9.
Various Species of Grasshoppers with spread wings.	Asparagus Beetle.
Various Species of Grasshoppers with spread wings.	Cucumber Flea Beetle.
Frame 6.	Frame 10.
Duplicate of Frame 1.	Virginia Tiger Moth.
Frame 7.	Variegated Cutworm.
Viceroy Butterfly.	Frame 11.
Milkweed Butterfly.	Catalpa Sphinx.
Frame 8.	Saddleback Caterpillar.
Codling Moth.	Frame 12.
Wax Apple with Codling	Mourning Cloak Butterfly.
Larva in burrow.	Black Swallowtail or Celery Butterfly.
Clover Seed Chalcid.	Frame 13.
Clover Leaf Weevil.	White Marked Tussock Moth.
	Fall Web Worm.

Another exhibit is a small bookcase which is labeled "Some Good Books on Entomology." Each volume is fastened to the bookcase by a brass chain so it cannot be carried off. The more important entomological publications of the Station are bound and given a place on the shelves. The publishers of the following works have contributed a copy of each to this exhibit: "Smith's Economic Entomology," "Saunders' Insects Injurious to Fruits," "Weed and Dearborn's Birds in their Relation to Man," "Comstock's Manual of Entomology," "Chittenden's Insects Injurious to Vegetables," "Sanderson's Insects Injurious to Staple Crops." A few other books were solicited for the exhibit, but the publishers failed to comprehend their opportunity and are not represented.

A case of spray nozzles, valves, stopcocks, pressure-gauges, hose attachments and other small accessories of spraying outfits are shown, the pieces having been contributed by the manufacturers. A small compartment of the case is given to each company contributing, and in this are a number of small pieces which represent any superior or new devices of merit or interest made by such company. Each piece is secured to the case by a piece of brass chain of sufficient length to permit the piece being removed from the compartment and held in the hand for examination. (See Fig. 3, Pl. 23.)

There are two bundles of wheat, each containing 560 straws, all of which in one bundle are infested with Hessian fly, and all of which in the other are free from Hessian fly. The wheat is of the same variety and was all gathered from the same field during the same season. An illustration of these two bundles is found in Bulletin 177 of the Ohio Experiment Station. The two jars of wheat shown in

figure 2 of the same Bulletin are also a part of the exhibit. In one of the jars is the harvest from 4313 straws infested with Hessian fly and in the other the harvest from an equal number of straws not infested with this insect.

There is an exhibit, similar to the last mentioned, showing the harvest from wheat infested with jointworm as compared with wheat not so infested.

During the past two seasons there has been quite an exhibit of the work of the two species of bark-beetles most injurious in Ohio, viz.: *Scolytus rugulosus*, and *Phlaeotribus liminaris*. Entire trees in various stages of infestation and decay have been shown, as well as breeding jars with beetles at work in various stages of development.

A device for showing small photographs of important work, spraying machines, and economic insects, is a rotary stand, modeled after those commonly used for showing illustrated postcards. There are eight faces for pictures, all of which are covered with glass. (See Fig. 4, Pl. 23.)

Large maps of Ohio are used for showing the distribution and prevalence of injurious insects in some seasons. Silk-headed tacks of different colors are used for indicating localities. Blue-headed tacks were used to indicate the localities from which wheat jointworm was reported in 1908 and on the same map red-headed tacks were used to indicate the reports received in 1909. There were several hundred of these for each of those years.

Results of entomological work on crops are also shown by the crop harvest. In the illustration of the exhibit, Plate 21, is seen a large crate of apples. Here are shown all the sound apples from a well-sprayed tree and in smaller crates beside the large one are the wormy apples from the same tree. The dropped apples from the same tree were likewise separated, the wormy from the sound. The crop from an unsprayed tree belonging to the same orchard was shown in the same way.

On either side of the pile of apples was a framed poster and map showing location of the Ben Davis trees in the Stokes orchard, which netted over \$1,000 per acre in 1908. This was to show that a solid acre was used and that no selection or gerrymander was employed to find the trees for this acre.

Similar displays of grapes or other fruits are made if we happen to be working on insects which injure them.

A number of simple microscopes of the pattern shown in Fig. 4, Pl. 22, are mounted on a poplar board which is stained black, and under each is some minute insect, such as a flea or other interesting

subject, perhaps the dissected mouth-parts of a beetle or grasshopper. The microscopes are screwed to the board and the board is screwed to the table to prevent theft.

We have a considerable number of large bromide pictures. These are set in light poplar frames, painted black, no glass being used. These are used at the State Fair only. The subjects illustrated are various. Different types of spraying machinery and entomological devices are shown. Results of insecticidal practice are fully illustrated in these pictures by means of contrasted harvests, contrasted plants, vineyards, fields, etc. Three pictures are placed in each panel or frame. These pictures are placed behind the rest of the exhibit to economize space and to furnish a suitable background.

Shipping Packages

Several years' experience in handling shipping packages of all kinds and shapes has led the Coöperative Department to require that, so far as possible, boxes approximating 5 to 6 feet long, 2 feet wide and 16 to 20 inches high be used. Two or four men can handle boxes of this shape more readily than short, cubical-shaped boxes. The weight of each box after being filled should not greatly exceed 100 pounds. A strong iron handle is fastened to each end, the top is secured by strap-iron hinges at the back and by hasp and staple fastenings at the front. The hasps are secured over the staples by means of large harness snaps. At the close of each fair, a seal is applied to each box, as soon as it is filled, and this must not be broken except by a properly authorized employe of the Station.

The Entomological Department uses excelsior pillows for packing. This prevents loss of packing material and keeps cases, etc., more free from dirt and dust than would be possible if loose excelsior were used. The pillows are made of strong, cheap muslin. Each insect case, Riker mount, etc., has a muslin slip or bag into which it fits for protection against dirt and dust. Compartments are made in the long boxes for such articles as the nozzle-case, the book-case, etc. Some pieces, such as maps and the rotary photograph stand have cases specially built for them, since they would not readily be accommodated in the long boxes.

Since the inventory of the Entomological Department comes second in order in the records of the Coöperative Department, all boxes of our Department are marked O. A. E. S. 2. They are then marked Entomology 1, 2, 3, 4, etc., until every package has received a number. Any article which is meant to be packed in the box marked Entomology 4, for instance, is marked Entomology 4 (see Fig. 5, Pl.

23¹), and thus the work of packing is expedited and the chances for loss greatly minimized. A complete list of all the articles which belong in each box is tacked on the inside of the cover or kept in possession of a designated person for ready reference.

RECENT OBSERVATIONS UPON EUROPEAN INSECTS IN AMERICA

By E. P. FELT, *Albany, N. Y.*

The occurrence of large numbers of brown tail moth nests upon seedlings imported last winter and the year before has greatly stimulated interest on the eastern coast, in the possibility of introducing pests with the importation of nursery stock. The thorough inspection for brown tail moth nests has resulted in finding a number of other insects. The introduction of the pine blister rust has also tended toward more thorough inspection. It is proposed in this brief account to notice a few pests which have been brought to attention during the last few months, and it is hoped that this paper will be but one of a series discussing briefly, insects which have been detected on importations of nursery stock or giving accounts of other forms likely to be brought into the country in this manner. We would welcome in this connection the coöperation of specialists, since they are best qualified to indicate the more dangerous species and to point out the best method of detecting them in shipments of stock.

Pissodes notatus Fabr. Seedling pines shipped from Oudenbosch, Holland, and submitted for examination by the State Department of Agriculture, had the stems infested by full grown larvæ which shortly pupated. Adults of the above species were reared in early May. This European species, kindly identified by Dr. A. D. Hopkins of the U. S. Bureau of Entomology, is about one third larger than our native *Pissodes strobi* Peck, and is most easily separated therefrom by the indistinct ochreous red coloration and the smaller, more inconspicuous, whitish spots on the distal third of the wing covers. Doctor Hopkins states that this is a very important enemy of the pine in Europe and that owing to the danger of its becoming a serious pest in this country, every precaution should be adopted to prevent its obtaining a foothold in America. It would certainly

¹ The illustrations for this article were prepared by Messrs. W. H. Goodwin and W. P. Beeching of the Ohio Station.