

Official Test of Agricultural Machinery in Japan

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The selection of machinery is a matter of importance and great concern to farmers when they are ready to start using machinery in place of hand tools commensurate with the progress in agricultural mechanization. So in order to furnish authoritative guides for farmers to select machines, tests for the technical evaluation of machines by official agencies become necessary. On the other hand such tests by official agencies are indispensable not only for the sake of trade by machinery makers but also to ensure the improvement and advance of machinery.

Although agricultural research and experiment stations of the State and prefectures have been carrying out agricultural machinery tests from pre-war days in Japan, in most cases the tests were conducted on an unofficial or temporary basis and the results were not extended to farmers.

So the official test dates back to 1949 when the Ministry of Agriculture and Forestry began the systematic tests on request. Afterwards the Agricultural Mechanization Promotion Law (AMPL) was enacted in 1953 and the national test came to be enforced under the provision of the AMPL. By the amendment of the AMPL in 1962, the Institute of Agricultural Machinery (IAM) has been established and the national as well as the IAM tests came to be performed by the Institute.

At present some prefectural agricultural experiment stations are conducting tests upon the request of makers, but because general users such as farmers, etc. can not obtain the

result thereof, official tests in Japan can be termed as that which are carried out by the Institute of Agricultural Machinery.

National test: This test is a model one based upon the Agricultural Mechanization Promotion Law and is not to test individual machine produced. The responsibility to manufacture the same machines as the model which has been tested rests with the makers. The Ministry of Agriculture and Forestry inspects their products.

The test is made when it is requested and is not a compulsory test. The request is normally made by the maker and in the case of an imported product, by its dealer.

The test codes are determined by the Ministry of Agriculture and Forestry upon the deliberation of the Test Division of the Agricultural Mechanization Council. The codes include the standard to pass the test, and the machine which passed the test is permitted to affix a "pass mark." Even if a machine failed to pass the test the sale is not prohibited but actually the sale becomes quite difficult.

As to the result of the test the Ministry makes public the name and performance of the passed machinery. From 1970 a detailed report of the test is to be issued for the benefit of the general consumers.

The Ministry of Agriculture and Forestry determines the kinds of machinery to be tested in each fiscal year duly considering the status of agricultural mechanization, the importance of each kind of machinery and the degree of extension. In other words, the national test

is not conducted each year on all kinds of agricultural machinery. Major reason is that there are so many new types of machinery to be marketed anew each year that it is practically impossible to test all of them.

The various kinds of machinery tested in the past several years and those to undergo tests during this fiscal year are as follows:

(1) Agricultural tractor (Walking type), (2) Agricultural tractor (Riding type), (3) Fertilizer drill, (4) Power sprayer, (5) Power duster, (6) Urine spreader, (7) Power reaper (Binding type), (8) Self-feeding type head thresher, (9) Fodder cutter, (10) Grain dryer, (11) Rubber roll for rice huller.

Recently about 60 models have been tested each year.

IAM test: In Japan agricultural mechanization has made a remarkable progress in recent years. One salient reason for it is the development of new kinds of agricultural machinery such as binder, Japanese-type combine and transplanting machine. These machines are in the stage of development and there is still room for improvement and because such machinery is new to farmers proper guidance for selection must be provided. That is, an official test for technical evaluation of the machinery is necessary for both the makers and farmers.

To ensure the national test strictly provided test code and the standard to pass the test are required and to stipulate the same a certain period for preparation is needed. During the preparation period, the IAM test is now being carried out by the Institute of Agricultural Machinery in place of the national test. Accordingly, the national test is conducted as soon as the preparation is completed.

The IAM test is undertaken out by the Institute based upon the Testing Regulation of the Institute, and its method is determined by the Institute. Because it is not a national test, there is no standard to pass the test and only the detailed test result is made public. The IAM determines the kinds of machinery to be tested in that year same as the national test. The IAM test is being

conducted on 20-40 types each year.

Test code: To make the test beneficial to farmers and extension service the testing procedure is usually composed of the following three aspects: performance, ease of operation and durability.

Performance: Performance test is generally classified into technical test (laboratory test) in laboratory and field test carried out actually in the field and or on crop-in-object.

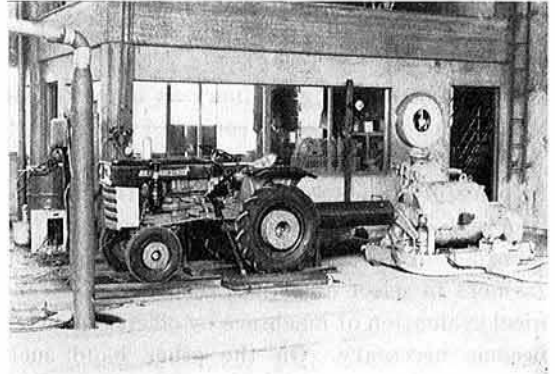


Fig. 1. PTO test of tractor.

As examples of the laboratory test, there are the PTO test of the tractor, pump characteristic test of the power sprayer and fan performance test of the grain dryer etc. These are the basic performance tests which are advantageous in that repetition and mutual comparison are possible. However, because these themselves are not the performances directly utilized by farmers when they practically use the machines in their fields, its defect is that



Fig. 2. Cutting performance test of fodder cutter.

the result must be interpreted so that users might understand it.

The field test is to test the actual performance in the field so the result is easily comprehended by farmers and others concerned. However, the field performance is not only influenced by regional conditions such as soil, crop and climate, but also the conditions themselves vary widely. Accordingly, for proper objective evaluation of the performance of machinery and comparison with other machines, it is necessary to conduct investigation under every combination of all conditions, but actual implementation is practically impossible.

Therefore, at present, the following two methods are being adopted in Japan. The first is the test of the same kind of many machines under several typical conditions at a given period and at a particular place. According to this method it is possible not only to compare to a certain extent the performances of several machines tested in the same year but also to compare the performance of machines tested in different years if the test is carried out at the same place each year. This method is mainly employed in field tests.

Another method is the laboratory test under repeatable conditions which resemble actual field conditions. For example, distribution performance tests of power sprayer and duster are generally made in the laboratory.

In this case it is possible to mutually compare the test results but attention should be paid that conditions in the laboratory should

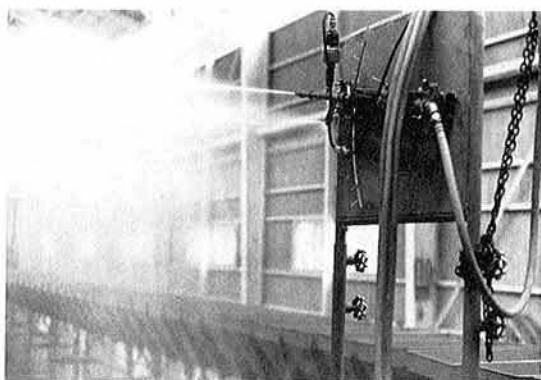


Fig. 3. Distribution pattern test of sprayer nozzle.

not be so different from actual conditions.

In the national and IAM tests, technical and field tests are combined to fully study the performance from as many angles as possible.

Ease of operation: Whether the machinery is easy or difficult to operate is a very important problem facing the farmers. Some farmers give priority to this point over performance. This sector is called 'human engineering'. If research further advances evaluation may become possible from numerical values. At present, in Japan, more than three test technicians actually operate the machinery and render their evaluation. Of course, measuring instrument is used wherever possible, for instance in such test as noise and the measurement of necessary force to operate various operating levers.

Principal items to be investigated in the test are: 1) exchange of parts and tools, 2) setting and adjusting of various parts, 3) handling in operation, 4) maintenance and 5) safety.

Durability: Needless to say, durability of machinery has a great influence on farmer's economy. When mechanization advances, more expensive machinery is used and durability becomes all the more significant.

However, the durability test involves a number of difficulties. One is that durability depends to a large extent on local conditions such as soil, crop, climate and operating hours. For instance, the wear of machinery related to soil is heavy in case the soil is sandy. Another difficulty is, as the word, 'durability' is self-explanatory, the durability test takes a long time. But if the test requires too much time, by the time the test result is made public the machinery may have been improved or the production may be suspended because a new type is being marketed, and the utilization value of the test becomes entirely lost.

Accordingly, a method to observe durability in a short time in the laboratory is mainly adopted in Japan. The method now being employed is to operate the machine for a given number of hours under artificial conditions similar to actual severe conditions and after-

ward it is disassembled and inspected. This method could not be termed as a full durability test so it is called, 'running test'. But, it is very useful because the defects and weak points can be discovered by this test.

The above explanations feature the common points of the test method now employed in Japan. And as for the detailed test methods on individual machinery please refer to the reference material¹⁾ published in this journal and to another reference material to be published afterward.

Reference

- 1) Arai, S.: Official test of walking tractors in Japan, *JARQ* 4 (4), 17-19 (1969).



Fig. 4. Measurement of noise (Handling test).