Conclusions

Comparing torque and power graphs before and after treatment:

(a) Performance

Engine of Tractor No 1 was in good condition before the tests and remained so for the duration of the test period. There is some increase in engine performance by up tp 10% in the Standard's PTO revolutions, but because the engine is near its new performance level, it is difficult to expect further improvement beyond this point.

In the engine tests of No 2 tractor ther is a significant increase in tractor performance. The increase expresses itself in the improved torque and in the reduction in the fuel consumption. This increase is noticeable between 1800-2000 R.P.M.

Most noticeable in this test is th. fact that the engines developed far greater power in higher R.P.M., i.e. the "drop" in revolutions coupled with the increase in torque is lesser still. At 1900 R.P.M. it was possible to increase the load by three times.

(b) The Mechanical State in accordance with the Oil and the Garage Tests

The state of tractor No 1's engine was good and stayed good. The state of tractor No 2's engine that was bad at the beginning of the test, did not improve and the engine still faces an overall. The overall, however, was differed by 250 hours. There is a significant increase in the sand content (Si) which had resulted in an increase wear expressed in an increase of Fe and other metals.

It is reasonable to assume that this increase is outside sourced, and that it is due to damage caused to the air filter during the usual work on the farm.

We expected increase in oil consumption and an increase in smoke and carbon discharges.

Testing of power transfer:

This test was conducted in line with the O.E.C.D. Standard. Power transfer was measured as a function of the number of revolutions and the fuel consumption.

In between the tests, the tractors did their usual farm jobs. They did receive the normal attention given to them on the farm. Prior to the tests air filters were changed for new (only for the duartion of the tests). The tractors were always fueled during the tests with identical fuel stored specifically for that purpose.

Each tractor was exemined at the following stages:

(a) Prior to adding NRG with new oil.
An oil sample was taken for laboratory tests prior to the oil change.

(b) Immediately after the addition of NRG and after the recommended running time.

(c) Interval exeminations after 150 working hours.

(d) Tests after 250 working hours immediately after oil change.

Results

(a) Tractors state before the examination.

Preasure Tests.

	Tractor 1	Tractor 2
Hours worked	5,154	8,609
Preasure (PSI)	345 Approx.	300 Approx.
Improved preasure after adding oil to the cylinder	370 Approx.	350 Approx.

(b) Examination of solids concetrations and wear in oil are given in Table 1.

(c) Results of torque tests, fuel consumption, usefulness and typical fuel consumption are described in the graphs.

These tests were conducted during July and ended in December (summer time) 1985 after 270 hours of operation with NRG for tractor No 1, and 250 hours of operation since the addition of NRG for tractor No 2.

Preamble

Wear of engines and mechanical components, is a natural ageing process that one cannot avoid. Manufacturers of engine and gearboxes recommend the use of certain lubricants and their changes at pre set intervals, for the purpose of reducing the natural wear and for extending the production life of an engine.

There exist a number of oil additives, the purpose of which is to reduce metal wear and prevent the gathering of harmful matters which are the by product of this process.

Generally, the lubricants recommended by the manufacturer include a certain level of additives to prevent (engine) wear and to neutralise their effect on the burned residues. It is not a question of disputing the quality of these oils or of the recommendations of the tractor's and engine manufacturer. All these recommendation must be universal for the whole series of tractors and their differing working conditions. It is wise, however, to check the effectiveness of the various mentioned additives as an answer to specific problems that may crop up during a long operation, and so improve the ongoing performance reduction of the engine and the elimination of the associated ever accelerating wear process.

The additives producers claim that their products help in cleaning engine parts by dissolving the accumulating solids and that they coat the metal surfaces by a protective film that is friction reducing and is long lasting.

One of these is NRG, the testing of which started at The Centre for Agricultural Research and the partial results of which are reported in this paper.

The means of testing, available to the Centre in this area are limited to checking the efficiency of power transfer, whilst testing the conditions of engine's operation. Oil laboratory tests are conducted by Panel Laboratoris.

Purpose of Tests

To check on the effect of adding NRG to a tractor's engine by measuring the power transfer, measuring the fuel consumption and rate of metal wear, before and after adding NRG.

Selection of Tractots Under Tests

For the purpose of these tests, two tractors which perform routine work on the farm were selected. Both old tractors, but both with a reasonable engine wear compared to their age, and without any known mechanical problems.

The evalution of wear was conducted by regular oil examination carried out at the Panel Laboratories on a regular basis for a long time prior to the commencement of the tests. The compression tests were conducted at the garage.

The Tests

Tests started during July and regulary continued till December 1985.

מינהל המחקר החקלאי
מרכז וולקני
המכון להנדסה חקלאית

Translation

INSTITUTE OF AGRICULTURAL RESEARECH
THE VOLCANI INSTITUTE
THE CENTRE FOR AGRICULTURAL ENGINEERING

TESTS ON THE EFFECTS OF ADDING NRG TO AGRICULTURAL TRACTOR ENGINES.

BY

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- Yehu Apt – Mechanics and Technology Division.
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Our Thanks

To Koty, the manager of Maale Gilboa Garage and his crew on their effortless help, and to Nahum, manager of Eletz Garage for his co-operation, without whome we would not have been able to conduct these complicated tests.

RESULTS

Date: July 5, 1982

The representative of NRG International brought one carton of product to be tested, it was an original carton containing twelve (12) original plastic containers. The name of the product was:

NRG 1540P, ANTI-FRICTION PROTECTION GASOLINE & DIESEL INTERNAL ENGINE TREATMENT

Every bottle contains 0.946 litres (one U.S. quart). The product is manufactured by:

NRG INTERNATIONAL CORPORATION,

The representative of the Israeli Bureau of Standards chose one bottle of the product at random. The NRG representative also brought one original engine treatment oil for gasoline and diesel engines from:

PAZ CHAMPION 40 API-SE/cc

Each sample containing 0.5 litres.

NOTE: The purpose of the tests was to measure the iron (metalwear) ppm for each samp

1) Oil - 40 PAZ CHAMPION after one minute of testing.

2) Oil - 40 PAZ CHAMPION with 20% NRG after one minute of testing.

3) Oil - 40 PAZ CHAMPION with 20% NRG after two minutes of testing. The oil was changed after test number two (2) and new PAZ/NRG mixture was added for the second run.

4) Oil - 40 PAZ CHAMPION original with no test.

5) Oil - NRG original with no test.

THE TESTS WERE CARRIED OUT UNDER THESE CONDITIONS

DESCRIPTION OF TESTING EQUIPMENT

Dayton, one phase, electrical engine, attaining a speed of 1725 RPM.

The product was positioned on a shaft contained in a TIMKEN test cup no. T 54148, working with one roller.

TEST DESCRIPTIONS

1) PAZ CHAMPION 40 oil was put into the test machine.

The pressure used was: 25 Foot Pound.
The test was for one (1) minute.
During the test the amperage meter read between 6 to 7 amps.

2) PAZ CHAMPION 40 oil with 20% NRG.

The pressure used was: 25 Foot Pound.
The test was for one (1) minute.
During the test the amperage meter read 6 amps.

3) PAZ CHAMPION 40 oil with 20% NRG oil.

The pressure used was: 25 Foot Pound.
The test was for two (2) minutes.
During the test the amperage meter read 5.5 amps.

The three samples compared to the PAZ CHAMPION 40 (sample number four) and NRG 1540P (sample number five) have been checked on iron.

Results:

Sample Number	1	2	3	4	5
Contains 10ml of:	PAZ CHAMPION 40	PAZ CHAMPION 40 + 20% NRG	PAZ CHAMP-ION 40 + 20% NRG	PAZ CHAMPION 40 ORIGINAL	NRG 1540P ORIGINAL
Time of Test:	1 Minute	1 Minute	2 Minutes	----	----
Iron (Fe) Per Miligram*	13	9	0.5	0.05	0.05

* Iron ppm found at 10 mil. during the test.

THESE TESTS SIGNED AND CERTIFIED BY:

ENG. B. DE MAYO
Director of Engineering
and Chemistry

DR. DOR KOKEN
Head of Laboratory
of Food and Chemistry