PROJECT REPORT FOR

PERFORMANCE EVALUATION OF FUEL ADDITIVE (BioMileger)ON TWO-WHEELER (GASOLINE)

Sponsored by

Shreeniwas Inventions, Nashik

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Report Approved by

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Executed By

Emission Certification Laboratory

ARAI
Progress through Research

The Automotive Research Association of India

(Affiliated to Min. of Heavy Industries & Public Enterprises, Govt. of India)

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1. Introduction :

M/s Shreeniwas Inovations Pvt, Ltd., Nashik approached ARAI, Pune to evaluate the Fuel Additive "BioMileger" on Gasoline two-wheeler "with and without Fuel Additive" for fuel consumption and mass emission.

After receipt of the 100 % payment from M/s Shreeniwas Inovations, ARAI executed the tests as per the test matrix guided by PCRA standard test procedure for the evaluation of the fuel additives which is attached herewith.

2. How Fuel additive work claimed by M/s. Shreeniwas inventions

Bio Mileager is an herbal extract for 2/3 wheeler petrol 2-stroke, 4-stork engine. Bio mileager is 100% Herbal Petrol Additive. Bio Mileager enzyme when mix with petrol in 2 ml for 1 litre proportion, breaks the hydro-carbon and improves combustion, which in turns increases the average of an engine. Bio Mileager removes the deposited carbon from the piston and the engine cylinder which reduces the friction and engine noise. Bio mileager helps in complete combustion which reduces carbon mono-oxide contain from the engine exhaust.

Bio mileager dissolves in petrol and prevent the vaporization of petrol. Bio mileager is only one of its types which increases the average of the engine and increases life of the engine..

Directions for use:

Recommended use: 2 ml for 1 liter of petrol.

- Best result: After use of 10 ml for 5 liters of petrol.

Benefits as claimed by Party:

- Eco-friendly, 100% Herbal.
- Removes carbon from engine hence reduces friction.
- Removes black smoke 80%.
- Reduces engine noise 20%.
- Saves petrol vaporization 5% - 10%.
- Increases engine power by 20%.
- Smooth drive.
- Increases average of the engine by 30 to 60%.

3. Objective:

A. To evaluate the Fuel Additive, Bio Mileger from M/s Shreeniwas Inovations, Nashik on Gasoline two-wheeler with and without Fuel Additive for fuel consumption and mass emission.

B. Test Matrix as per Table 1

4. Test Methodology

3.1 Vehicle preparation:

- M/s Shreeniwas Inovations has submitted Hero Honda Passion Pro vehicle.
- After receipt of the vehicle, leak check of the vehicle was carried out & commercial fuel was filled in it.
- Test was conducted on the vehicle in the presented condition as submitted by M/s Shreeniwas Inovations

3.2 Testing:

The test vehicle was subjected to following tests as shown in the test matrix;

Fuel Consumption test at Indian Driving Cycle & constant speed of 40 & 60 kmph was carried out without Fuel additive added in the vehicle as shown in the test matrix.

Mass emission test was carried out in as received condition as per PCRA test procedure (copy attached). A test lasting a total of 648 sec and comprising six Indian Driving Cycles (IDC) Ref Annexure 1, was carried out without interruption with six time repeating. During the test, the exhaust gases were diluted with air and a proportional sample was collected in the bag. The contents of the bag were analyzed at the end of the test. The total volume of the diluted exhaust and the distance covered by the vehicle were also measured from which the mass of each pollutant was calculated and was expressed in g/km. The gearshift pattern used for the purpose of mass emission test is given below.

Gear Shift Pattern in IDC:

Accln: I-II 13km/h, II-III 22km/h, III-IV 33km/h

Dccln: IV-III 28 km/h, III-II 16 km/h, II-I 10km/h.

After the completion of the first three mass emission test & constant speed fuel consumption test were carried out.

Vehicle Running in with additive i.e. BioMileger

25 ml of fuel addictive were added in 10 ltrs of commercial fuel and with this fuel the vehicle was run on the chassis dynamometer at a constant speed of 50 km/hr for 55 min & 30 km/hr for 5 min till we finish the 10ltr fuel. Mileage cover by the vehicle was 853 km. additionally; vehicle was run on the road for 100 km. Hence, total mileage covered by the vehicle was 953 km

After completion of vehicle running in, three mass emission tests followed by the constant speed fuel consumption tests on 40 and 60 kmph was carried out with fuel additive Bio Mileger.

- Dynamometer load has been applied on vehicle as per MoRTH/CMVR/TAP-115/116.

$$F = a + b * V^2 + M \, dv/dt$$

$$F = 35.28 + 0.0250 * V^2 + 190 \, dv/dt$$

Where: F = The load, in N

a = Coefficient of rolling resistance, in N

b = Coefficient of aerodynamic resistance, in N/ $(km/hr)^2$

M = Equivalent Inertia of the vehicle, in kg

V = Vehicle speed, in km/hr

TABLE 1: Test Matrix

Sr. No.	Test Details	Test Condition	No. of Repeated Tests
1.	Mass emission test on chassis dynamometer	Without fuel additive	3
2.	Fuel consumption at 40, 60 km/hr and Indian Driving Cycle	Without fuel additive	6 (each)
3.	Running in of vehicle on chassis dyno. with 10ltr fuel + 25 ml fuel additive at 50km/hr for 55 min & 30 km/hr for 5min (853km) AND running in on road for 100km	With fuel additive	--
4.	Mass emission test on chassis dynamometer	With fuel additive	3
5.	Fuel consumption at 40, 60 km/hr and Indian driving Cycle	With fuel additive	6 (each)

5. Specification of test vehicle

- Vehicle Model : Passion Pro
- Vehicle Make : Hero Honda
- Registration No : MH15 CH 9688
- Chassis No. : MBLHA10ER9GF34346
- Engine No. : HA10ED9GF37092
- Odometer : 8573 km

6. Equipments used

Sr. No.	Test Equipment	Make / Type	Details
1	Chassis Dynamometer	Froude Consine, U.K	Max. Power : 5 kW Inertia Range : 80-335 Kg Max. Speed : 100 kmph Inertia and road Load Control Accuracy : ±1 % of F.S.
2	CVS System	Horiba, 7200, Japan	Type : CFV
3	Exhaust Gas Analysis System	Horiba, 7200 H, Japan	CO-NDIR: NOx-CLA CO2-NDIR HC:FID
4	Fuel Consumption Meter	Onno-Sokki, Japan FP213S	Flow rate: 0.06 – 60 l/hr Accuracy : < ±0.5%

7. Project Duration:

22nd Jan' 2010 to 16th Feb'2010.

8. Test Result

Ref Annexure 2 to 6 for detailed test result

Mass Emission Test on Indian Driving Cycle (IDC)

Before Adding "BioMileger" in the Fuel

Test Date	CO g/km	HC (C_1) g/km	NOX g/km	CO2 g/km	F.C. km/l	Idle CO%	Idle HC ppm	Idle rpm
22/1/2010	0.76	0.30	0.30	29.37	75.66	0.08	110	1080
23/1/2010	0.57	0.30	0.30	28.17	79.44	0.08	118	1090
25/1/2010	0.53	0.32	0.30	28.65	78.18	0.08	120	1090

After Adding "BioMileger" in the Fuel

Test Date	CO g/km	HC (C_1) g/km	NOX g/km	CO2 g/km	F.C. km/l	Idle CO%	Idle HC ppm	Idle rpm
4/2/2010	0.67	0.36	0.35	27.80	79.49	0.11	205	1090
5/2/2010	0.67	0.36	0.35	28.25	78.28	0.12	187	1100
16/2/2010	0.52	0.38	0.37	27.27	81.34	0.12	163	1090

Overall Fuel Consumption

Overall Fuel Consumption Wiothout additive "BioMileger"

Sr. No.	Test Condition	Avg. Fuel Consumption (kmpl)	Weighing Factor as per PCRA	Weighted Fuel Consumption (kmpl)
1	IDC	75.27	0.5	37.64
2	40 kmph Const. Speed	96.70	0.25	24.18
3	60 kmph Const. Speed	55.90	0.25	13.97
Average Fuel Consumption with weighing factor				**75.79**

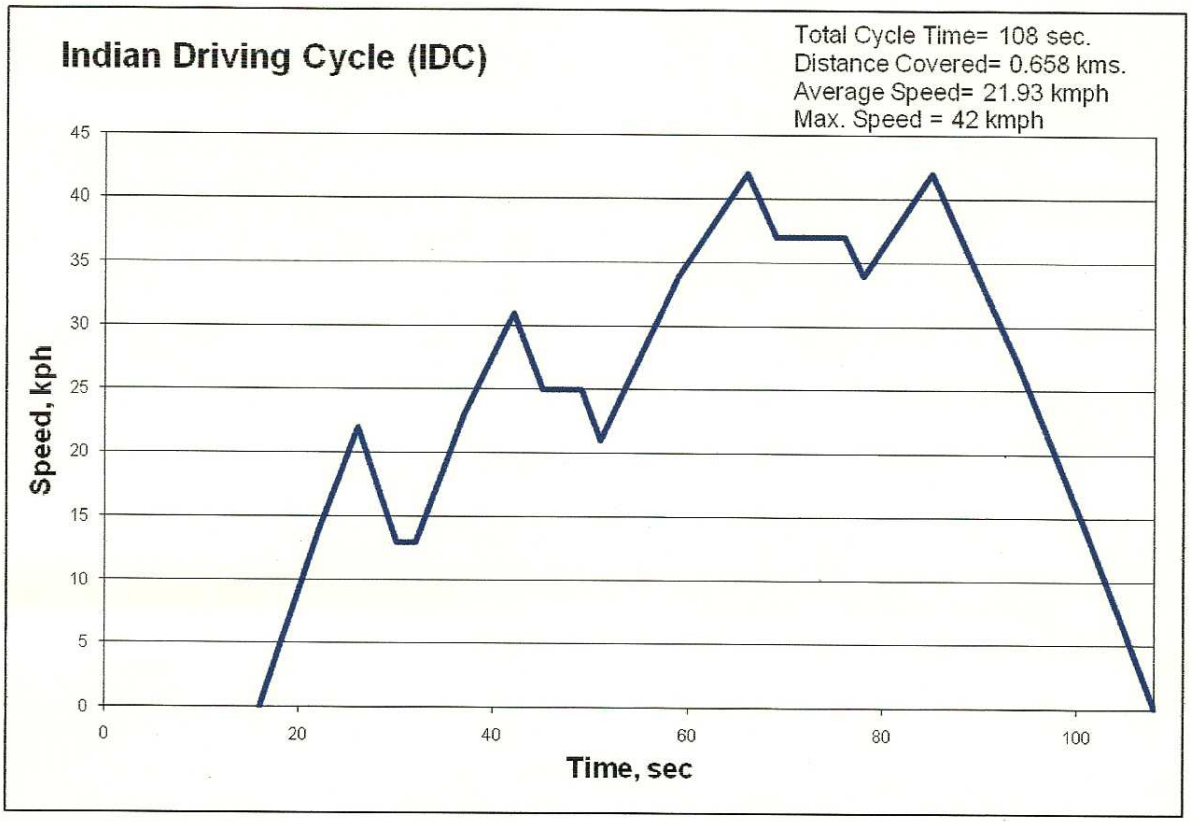
Overall Fuel Consumption with Additive "BioMileger"

Sr. No.	Test Condition	Avg. Fuel Consumption (kmpl)	Weighing Factor as per PCRA	Weighted Fuel Consumption (kmpl)
1	IDC	79.88	0.5	39.94
2	40 kmph Const. Speed	98.80	0.25	24.70
3	60 kmph Const. Speed	60.63	0.25	15.16
Average Fuel Consumption with weighing factor				**79.80**

9. Disclaimer

ARAI has given the test results on the vehicle actually tested at ARAI at the presented condition and is not applicable to general production. This test report does not indicate any measure of approval, certification, supervision, control of quality surveillance by ARAI of the vehicle/ Fuel. No extract, abridgement or abstraction from the test report shall be published or used to advertise the product without the written consent of the Director of ARAI, who reserves the absolute right to agree or reject all or any of the details of any items of publicity for which consent may be sought. The appropriate local courts at Pune shall have the jurisdiction in respect of any dispute, claim or liability out of this report.

Annexure 1 : Indian Driving Cycle Graph



Annexure 2 : Test results: Fuel Consumption on IDC (Indian Driving Cycle)

Before Adding "BioMileger" in the Fuel

Test Sr. No.	Distance (km)	Measured on PLU (lit)	Calculated Fuel consumption (kmpl)
1	3.946	52.94	74.54
2	3.942	52.66	74.86
3	3.951	52.31	75.53
4	3.947	52.43	75.28
5	3.956	52.26	75.70
6	3.923	51.8	75.73
Average FC (kmpl)			75.27

After Adding "BioMileger" in the Fuel

Test Sr. No.	Distance (km)	Measured on PLU (lit)	Calculated Fuel consumption (kmpl)
1	3.936	49.55	79.43
2	3.934	49.49	79.49
3	3.94	49.29	79.94
4	3.933	49.04	80.20
5	3.931	49.14	80.00
6	3.935	49.04	80.24
Average FC (kmpl)			79.88

Annexure 3 : Test results: Fuel Consumption on Constant Speed 40 kmph

Before Adding "BioMileger" in the Fuel

Test Sr. No.	Distance (km)	Measured on PLU (lit)	Calculated Fuel consumption (kmpl)
1	2.008	20.88	96.17
2	2.005	20.75	96.63
3	1.994	20.59	96.84
4	2.006	20.73	96.77
5	1.999	20.61	96.99
6	2.007	20.73	96.82
Average FC (kmpl)			96.70

After Adding "BioMileger" in the Fuel

Test Sr. No.	Distance (km)	Measured on PLU (lit)	Calculated Fuel consumption (kmpl)
1	2.007	20.38	98.48
2	2.000	20.34	98.33
3	1.997	20.24	98.67
4	2.006	20.27	98.96
5	2.000	20.15	99.26
6	2.008	20.26	99.11
Average FC (kmpl)			98.80

Annexure 4 : Test results: Fuel Consumption on Constant Speed 60 kmph

Before Adding "BioMileger" in the Fuel

Test Sr. No.	Distance (km)	Measured on PLU (lit)	Calculated Fuel consumption (kmpl)
1	2.000	36.09	55.42
2	2.000	36.09	55.42
3	2.004	36.09	55.53
4	1.991	35.31	56.39
5	2.004	35.70	56.13
6	1.999	35.37	56.52
Average FC (kmpl)			55.90

After Adding "BioMileger" in the Fuel

Test Sr. No.	Distance (km)	Measured on PLU (lit)	Calculated Fuel consumption (kmpl)
1	2.000	34.70	57.64
2	2.000	32.28	61.96
3	1.997	32.65	61.16
4	1.998	32.97	60.60
5	2.002	32.58	61.45
6	2.001	32.82	60.97
Average FC (kmpl)			60.63

Annexure 5 : Test results: Mass Emission Test on Indian Driving Cycle (IDC)

Before Adding "BioMileger" in the Fuel

Test Date	CO g/km	HC (C_1) g/km	NOX g/km	CO2 g/km	F.C. km/l	Idle CO%	Idle HC ppm	Idle rpm
22/1/2010	0.76	0.30	0.30	29.37	75.66	0.08	110	1080
23/1/2010	0.57	0.30	0.30	28.17	79.44	0.08	118	1090
25/1/2010	0.53	0.32	0.30	28.65	78.18	0.08	120	1090

After Adding "BioMileger" in the Fuel

Test Date	CO g/km	HC (C_1) g/km	NOX g/km	CO2 g/km	F.C. km/l	Idle CO%	Idle HC ppm	Idle rpm
4/2/2010	0.67	0.36	0.35	27.80	79.49	0.11	205	1090
5/2/2010	0.67	0.36	0.35	28.25	78.28	0.12	187	1100
16/2/2010	0.52	0.38	0.37	27.27	81.34	0.12	163	1090

Annexure 6 : Overall Fuel Consumption

Overall Fuel Consumption Wiothout additive "BioMileger"

Sr. No.	Test Condition	Avg. Fuel Consumption (kmpl)	Weighing Factor as per PCRA	Weighted Fuel Consumption (kmpl)
1	IDC	75.27	0.5	37.64
2	40 kmph Const. Speed	96.70	0.25	24.18
3	60 kmph Const. Speed	55.90	0.25	13.97
Average Fuel Consumption with weighing factor				**75.79**

Overall Fuel Consumption with Additive "BioMileger"

Sr. No.	Test Condition	Avg. Fuel Consumption (kmpl)	Weighing Factor as per PCRA	Weighted Fuel Consumption (kmpl)
1	IDC	79.88	0.5	39.94
2	40 kmph Const. Speed	98.80	0.25	24.70
3	60 kmph Const. Speed	60.63	0.25	15.16
Average Fuel Consumption with weighing factor				**79.80**

Overall % improvement in Fuel Consumption	**5.29 %**

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Annexure - I (a)

PCRA RECOMMENDED TEST PROCEDURE FOR EVALUATION OF ADDITIVE/DEVICE FOR FUEL ECONOMY AND EMISSIONS

Category: 2-wheeler/3-wheeler (2-stroke/4-stroke S.I. engine)

1.0 PURPOSE

Evaluation of additive / device for fuel economy and emission

2.0 SCOPE

This standard provides a test procedure and test operating conditions for screening of fuel economy additives and / or emission control devices for their effectiveness

3.0 Test Vehicle, fuel and engine oil

3.1 Test Vehicle:

2-stroke S.I. engine

Vehicles of model of year 1998 and upward will be used.

BAJAJ SUPER - 150 CC/Kinetic Honda/LML Scooter/ Bajaj Classic-5 port LML scooter with catalytic converter shall be used. It should conform in all its parts, components and systems to the design and / or standard production series.
One of the test vehicle model as specified in this procedure will be taken up for the test.

4-Stroke S.I.engines

Vehicles of model of year 1998 and upward will be used.
Any model of Bajaj/Hero Honda/LML/TVS will be used. It should conforms in all its parts, components and systems to the design and/or standard production series

Three-wheeler

Any model of Bajaj (year 1998 and upward) will be used.

3.2 Fuel

Commercial unleaded gasoline fuel is to be used for test and should meet the BIS 2796:2000 specifications or subsequent revisions.

3.3 Engine Oil

2-Stroke

2 T engine oil as per manufacturers recommended quality & quantity to be used. Same batch of oil should be used for the entire duration of testing

4-stroke

4T engine oil as per manufacturer's recommended quality & quantity of oil to be used. Same batch of oil should be used for the entire duration of testing. In every test, fresh oil should be used.

4.0 DE-INDUCTION AND INDUCTION RUNS

A de-induction run without additive/device for 1000 km shall be carried out under normal driving condition followed by the base line performance with the commercial unleaded gasoline fuel without any Additive/device. The base line performance will include fuel economy and emission An induction run with additive treated fuel/device is to be carried out as per manufacturer' recommendation not exceeding 1000 kms after base line performance with commercial unleaded gasoline fuel. Fuel consumption & emission test with additive treated fuel/device must be taken after completing this induction run with additive /device Where there are no specific recommendations by the manufacturer, an induction run of 1000 km shall be carried out in case of additive. After completion of the induction run the additive/device shall be evaluated in terms of fuel economy and mass emissions.

No induction run for device is required unless specified by manufacturer. The term manufacturer stands for device/additive manufacturer.

5.0 TEST PROCEDURE

5.1 Test Preparation

The chassis dynamometer should be fully warmed up. The tyre pressure should be as per manufacturer's recommendation and if new tyres are used, they should have at least run for 200km. Preferably Same driver should be used during the trials. Driving can be done with robot driver.

5.2 Constant Speed Mode

Test shall be conducted on chassis dynamometer using road load simulation mode at constant speeds of 40 & 60 km/hr.

5.3 Driving Cycle Test

The Indian driving cycle shall be used for this evaluation. The driving cycle test for emission measurements and fuel economy shall be carried out with hot start (by running 4 cycles) with running of 6 measurement cycles. IDC is annexed.

The inertia loading should be ULW+75 kg for 2 wheelers and ULW+225 kg for 3 wheelers. The driving cycle fuel consumption should be based on direct measurement or the carbon balance method from the exhaust has concentration measured. The test will be repeated 3 times and average should be considered as the final result. The exhaust gas concentration of CO, THC and NOx will be measured and expressed in g/km.

6.0 RESULTS

6.1 At least 6 readings of fuel consumption shall be reported.

6.2 Driving cycle test: For driving cycle, fuel consumption and exhaust mass emission, the final result will be average of 3 tests.

6.3 Fuel consumption in the constant speed mode and the average fuel consumption in the driving cycle mode shall be multiplied by the following weighting factors:

Driving Mode	Weighing Factors
Indian Driving Cycle (IDC)	0.50
40 km/hr	0.25
60 km/hr	0.25

29/07/04